



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

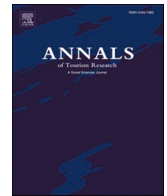
Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



ELSEVIER

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Annals of Tourism Research

journal homepage: www.elsevier.com/locate/annals

Domestic tourism spending and economic vulnerability

Nguyen Phuc Canh^{a,*}, Su Dinh Thanh^b^a School of Banking, University of Economics Ho Chi Minh City, Ho Chi Minh 700000, Viet Nam^b School of Public Finance, University of Economics Ho Chi Minh City, Ho Chi Minh 700000, Viet Nam

ARTICLE INFO

Section editor: Yang Yang

JEL classification:

Z32
Z38
E30
D81
N10

Keywords:

Tourism
Travel
Vulnerability
Resilience
Time-varying
Panel data

ABSTRACT

This study examines the influence of domestic tourism on economic vulnerability index (EVI). Domestic tourism spending has a significant effect in reducing EVI. These results are consistent with two sub-indices of EVI (shock index and exposure index). Interestingly, it is found that: (i) this impact is consistent in low- and lower-middle-income countries, while domestic tourism has a non-significantly effect in upper-middle and high-income countries of increasing EVI; (ii) these results are consistent in the long-run; and (iii) the impact of domestic tourism is consistent in both the 2002–2007 and 2008–2012 periods, but is statistically non-significant in the 2013–2017 period. Notably, we find that domestic tourism spending has a U-shape effect on EVI; while international tourism has an increasing effect.

Introduction

The Covid-19 pandemic has influenced the tourism industry severely across the globe. According to [Ali and Cobanoglu \(2020\)](#), most travellers (around 63.8%) have cancelled their trips. As a result, the global tourism industry is projected to shrink by more than 50% in 2020. The World Travel & Tourism Council ([WTTC, 2020b](#)) analysed the impact of Ebola on the tourism industry in Sierra Leone¹ and found a decrease of 50% in tourism in 2014 compared with 2013, with the economic growth rate dropping to 4.6% from 7.8%. These facts highlight a key facet of the tourism sector–vulnerability. That is, changes in the tourism industry can lead to economic vulnerability.

In recent decades, keen attention has been paid to economic vulnerability ([Briguglio et al., 2009](#)), since the concept of economic cycles can only capture a dimension of vulnerability and economic fluctuations ([Noy & Yonson, 2018](#)). Economic vulnerability is referred to as a ‘risk’ to economic resilience ([Gnangnon Sena, 2016](#)), which is the likelihood of a system being affected negatively by shocks or perturbation ([Naudé et al., 2009](#)). Recently, [Feindouno and Goujon \(2016\)](#) introduced the economic vulnerability index (EVI), which is the weighted index of instabilities from trade, agriculture production, natural disasters, environment, economic structures, populations, and sub-region remoteness. The index is appropriate for capturing the full picture of a country’s vulnerability,

* Corresponding author at: School of Banking, University of Economics Ho Chi Minh City, 59C Nguyen Dinh Chieu, District 3, Ho Chi Minh 700000, Viet Nam.

E-mail addresses: canhnguyen@ueh.edu.vn (N.P. Canh), dinhthanh@ueh.edu.vn (S.D. Thanh).

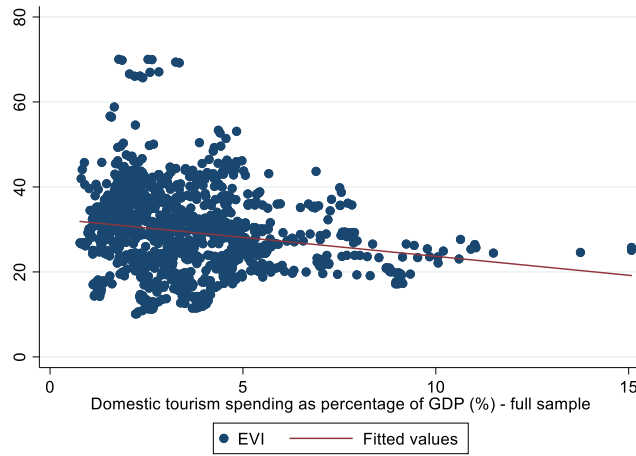
¹ Guinea, Sierra Leone and Liberia are three infected countries.

<https://doi.org/10.1016/j.annals.2020.103063>

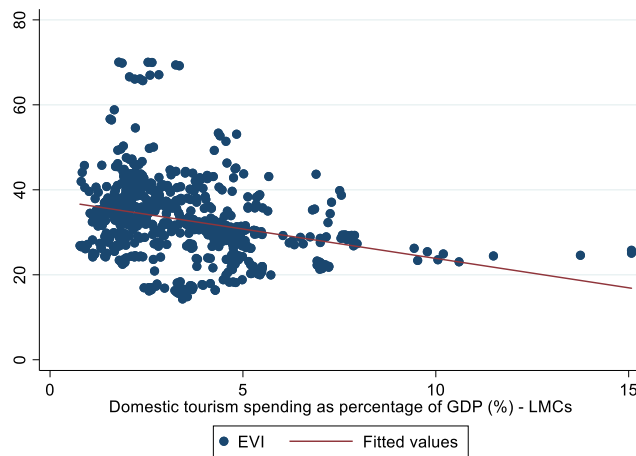
Received 28 June 2020; Received in revised form 14 August 2020; Accepted 15 September 2020

Available online 20 October 2020

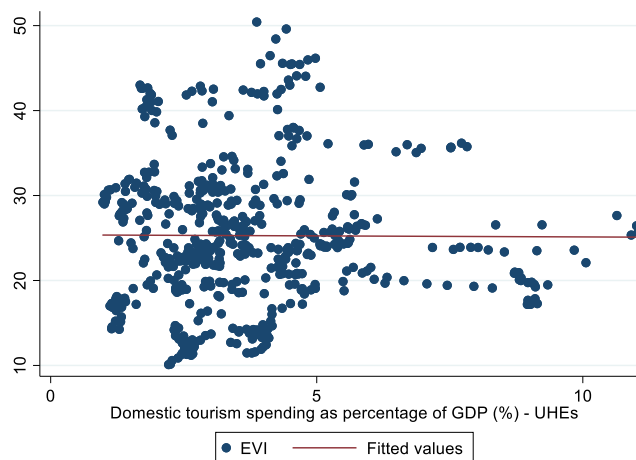
0160-7383/© 2020 Elsevier Ltd. All rights reserved.



a) Full sample



b) LMCs



c) UHCs

(caption on next page)

← Fig. 1. Observations on the relationships between domestic tourism and economic vulnerability.

with instabilities from economics, society, and the environment. The advent of EVI creates a very favourable opportunity for further empirical investigation of the determinants of economic vulnerability, which is, nonetheless, scarcely dissected in the current literature.

The literature emphasises several positive contributions of tourism development to the economy, such as job creation (especially for non-skilled or low-skilled labour), investment, production, and socio-economic development (Alam & Paramati, 2016; Li et al., 2016). These contributions help reduce economic vulnerability. However, an increasing trend in recent studies (Bangwayo-Skeete & Skeete, 2020; Seraphin et al., 2018) is to raise concerns about the consequences of tourism and sustainable tourism, especially mass tourism or over-tourism; that is, the effects of tourism development on economic vulnerability should be further examined.

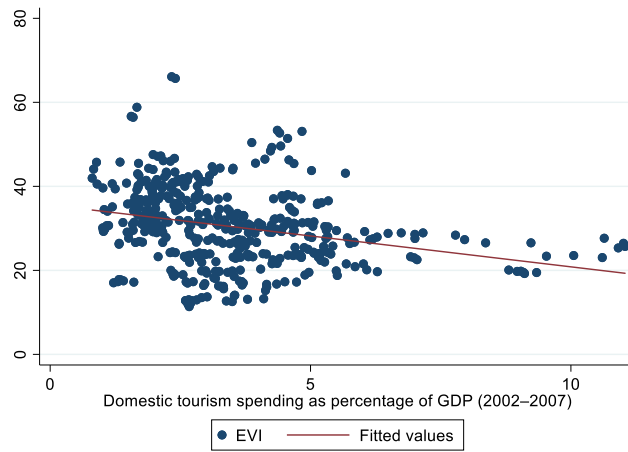
Notably, there are studies concerning the contributions and consequences of international tourism on host countries (e.g., see Nassani et al. (2018), Zhang and Gao (2016)), while less, or likely not much attention is paid to the influences of domestic tourism. Domestic tourism is defined as tourism activity by that country's residents for both business and leisure trips (WTTC, 2019); thus, there are quite significant differences between international tourism (tourism activities by international visitors) and domestic tourism. In the view of economic activity, international tourism is seen as an exporting sector that depends on external demand and some external supply (e.g., transportation), which implies that the development of international tourism will expose the domestic economy to international shock or a more vulnerable economy (see Barrot Araya et al. (2016), Gnanon Sena (2016)). In contrast, domestic tourism is characterised by internal demand and internal supply, which can be relatively independent from international shocks. These characteristics of domestic tourism, along with its benefits for the economy (i.e. job creation, investment, and production), can act as good forces in reducing economic vulnerability.

Therefore, this study endeavours to shed light on the linkages between domestic tourism development and economic vulnerability through the influence of domestic tourism spending on EVI. Specifically, the study examines whether domestic tourism helps to reduce or cause this vulnerability. Empirically, the study is conducted for a global sample of 79 countries, from 2002 to 2017, based on the availability of data. The two-step system generalised method of moments (GMM) estimate is recruited as the main estimator to deal with endogeneity. Also employed for robustness checks are the sequential (two-stage) estimation of linear panel data models (SELPDM), the panel-corrected standard error estimator (PCSE), and the feasible generalised least squares estimator (FGLS). In the estimation process, control variables (i.e. institutional quality, economic growth, trade openness, industrialisation, inflation, unemployment, urbanisation, and population density) are added one by one to check for sensitivity.

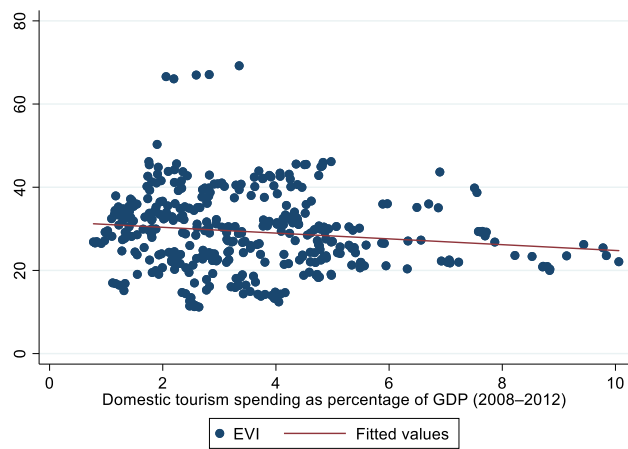
The study uses the income classification from the World Bank to divide the full sample of 79 countries into two sub-samples, with 43 low- and lower-middle-income countries (LMCs) and 36 upper-middle and high-income countries (UHCs). Fig. 1 presents the relationship between domestic tourism spending (% GDP) and EVI for the full sample of 79 countries and two sub-samples over the 2002–2017 period. Fig. 1a and b also shows the negative relationships between these two variables for the full sample and LMCs. The case is different when it comes to UHCs, implying a possible difference in the influence of domestic tourism on EVI between the two sub-samples. Therefore, to detect any difference in this kind of impact, an in-depth analysis is also performed for the two sub-samples of LMCs and UHCs.

In the period of study, from 2002 to 2017, the 2008 global financial crisis is argued as a very important economic cycle that may change the nature of the relationship between economic factors (Feldkircher, 2014). Furthermore, recent studies in tourism economics highlight the negative/side-effects of tourism, especially mass tourism or over-tourism (Garau-Vadell et al., 2018). These issues may lead to different impacts of domestic tourism on EVI over time. Fig. 2 presents the relationship between domestic tourism spending (% of GDP) and EVI in three periods: 2002–2007, 2008–2012, and 2013–2017. It shows a steeper negative relationship between the two factors, notably in the periods 2002–2007 and 2008–2012, while the negative relationship appears weaker in the 2013–2017 period. Thus, an analysis is performed to detect any difference in the impact of domestic tourism between the sub-periods, which comprise the pre-crisis period (2002–2007), in-crisis period (2008–2012), and post-crisis period (2013–2017). A long-run estimate by the fully modified ordinary least squares (FMOLS) approach and canonical cointegrating regression (CCR) is also carried out. The empirical results attained are robust and consistent.

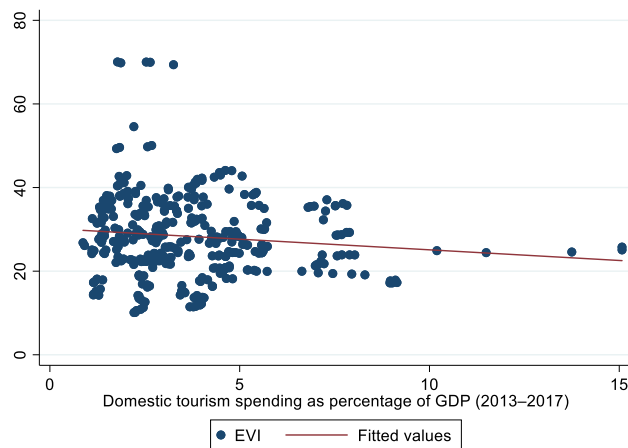
This study finds that domestic tourism spending has a consistent and significant negative impact on EVI, which implies a positive contribution of tourism to reducing the vulnerability of the economy. Interestingly, the results show the negative and consistent impact of domestic tourism on EVI in LMCs, while the impact is non-significant and positive in UHCs. The findings are robust in long-run estimates. This result supports a tourism-growth-led policy with a focus on domestic tourism, which not only contributes to economic development, job creation, and inequality reduction but also helps ease the vulnerability of the economy, as evidenced. However, the results also imply that governments in LMCs should act sensibly, while governments in UHCs should be cautioned against rapid increases in tourism, such as the mass tourism seen in emerging economies in recent years. Notably, analysis of the three sub-periods shows evidence of the significant negative impact of domestic tourism on EVI in the periods 2002–2007 and 2008–2012. However, the impact of domestic tourism on EVI is statistically non-significant in the period 2013–2017; this implies a relative change in the effects of domestic tourism on the vulnerability of the economy over time and signifies, in fact, a change for the worse. Concerning the different results for the two sub-samples (LMCs and UHCs), the study findings endorse tourism development as a good policy in LMCs. However, conversely, tourism development should be treated with caution in UHCs, especially given the recent changes in its contribution. Furthermore, the study examines the impact of domestic tourism spending on two sub-indices of EVI (i.e. shock index and exposure index), with consistent findings. In particular, domestic tourism spending has a U-shape relationship with EVI, which implies that the appropriate development of domestic tourism would support economic resilience; however, over-tourism



2a) Period of 2002–2007 (pre-crisis)



2b) Period of 2008–2012 (in-crisis)



2c) Period of 2013–2017 (post-crisis)

(caption on next page)

← Fig. 2. The relationships between domestic tourism spending and EVI in three sub-periods.

or mass tourism would cause economic vulnerability. Lastly, the study finds that while domestic tourism spending hurts EVI, international tourism increases EVI. Thus, the results arrive at important policy implications.

The study is structured as follows. The next section is the literature review. The [Methodology and data section](#) presents the methodology and data. The results are discussed in detail in the [Results and discussion](#) section. And the last section is the conclusion.

Literature review

This section focuses on the vulnerability of the economy and the possible roles of tourism. Then, the influence of tourism from three main perspectives (economics, social issues, and the environment) is discussed to explain possible channels of influences of domestic tourism on economic vulnerability. Finally, the key points from the discussion are emphasised in order to form the hypotheses.

The vulnerability of the economy and potential roles of tourism

In the economics literature, economists have paid huge attention to fluctuations in economic growth and in economic cycles (Mathonnat & Minea, 2018). The vulnerability of the economy, or economic vulnerability, has only been considered in recent decades, but is seen as a broader concept (Noy & Yonson, 2018). Economic vulnerability was initially developed in the 1990s by Briguglio (1993), Briguglio (1995), Briguglio (1997) and refers to the 'risk' to economic resilience (Gnangnon Sena, 2016). Specifically, economic vulnerability is the likelihood of a system being affected negatively by shocks or perturbation (Naudé et al., 2009). The system can be an individual organisation or an economy (Essers, 2013). Microeconomics examines the shocks and impact on the wellbeing of individual households (Gnangnon Sena, 2016), while macroeconomics dissects the shocks and impact on the overall economy (Seth & Ragab, 2012).

The literature shifts the primary focus to methods of measuring economic vulnerability (e.g. see Briguglio et al. (2009), Feindouno and Goujon (2016)). Similarly, several recent studies seek to consider the vulnerability of an economy from three main aspects: economic instability (Kerschner et al., 2013), social instability (de Loyola Hummell et al., 2016), and environmental instability (Nguyen & Liou, 2019). Following this line, Feindouno and Goujon (2016) introduce EVI, which is a weighted index of instabilities from trade activities, agricultural production, natural disasters, environmental issues, economic structures, populations, and the remoteness of sub-regions in a country. In detail, EVI is a synthetic index of structural vulnerability composed of the magnitude of shocks and exposure to shocks, which is independent of current policy or resilience and is scaled from 0 to 100² (Feindouno & Goujon, 2016). EVI includes two sub-indices: (i) the shock index and (ii) exposure index. The shock index is a weighted average of the victims of natural disasters (1/4), instability in agricultural production (1/4), and instability in exports of goods and services (1/2). The index accurately reflects the size and likelihood of shocks that can negatively impact on the economy. The exposure index is a weighted average of population size (1/4), remoteness from world markets (1/4), exports concentration (1/8), share of agriculture, forestry and fishery in GDP (1/8), and share of the population living in the low-elevated coastal zones (1/4). This index properly reflects the exposure and resilient capability of the economy to withstand shocks. However, the determinants of economic vulnerability have hardly been investigated. Bussière and Mulder (2000), for instance, find that election periods are positively linked with higher economic vulnerability. Kerschner et al. (2013) show that the US economy is vulnerable to peak oil. Countries with higher economic growth before the 2008 global financial crisis, as noticed by Feldkircher (2014), were more economically vulnerable during the crisis. Interestingly, Barrot Araya et al. (2016) and Gnangnon Sena (2016) agree that higher economic integration would cause greater vulnerability to a country due to greater exposure to international shocks. Some recent studies, one of which is that by Le (2019), highlight the problem of vulnerability in developing economies, which also compels that more attention be paid to the determinants of economic vulnerability.

The tourism literature has highlighted the contribution of the tourism sector, such as job creation and socio-economic development (Alam & Paramati, 2016). However, there are concerns about the consequences of tourism, mostly in connection with international tourism (e.g., see Nassani et al. (2018), Zhang and Gao (2016)). There appear to be no studies on the consequences of domestic tourism on economic vulnerability. The nature of internal demand and supply of domestic tourism should make it a positive factor in reducing economic vulnerability, in contrast with international tourism, which depends on external demand and supply and thus is exposed to international shock. That is, the benefits from domestic tourism (i.e. job creation, investment, and production) can reduce economic vulnerability.

Tourism and economic contribution

According to WTTC (2020a), the tourism industry is now a major economic sector which makes a significant contribution to the economy via two fundamental channels; namely, economic growth and employment (Alam & Paramati, 2016). Balaguer and Cantavella-Jorda (2002) find that tourism development contributes positively to economic growth in Spain. Also in Spain, Inchausti-Sintes (2015) adds that tourism can be a substitute for weakened domestic demand. Thus, Jucan and Jucan (2013) suggest that

² A higher level of EVI means higher vulnerability.

policymakers employ tourism as a solution for fighting against an economic crisis. In the same vein, [Dogru and Bulut \(2018\)](#) emphasise the positive contribution of tourism to the economic growth of seven European countries during the crisis period. Therefore, as proposed by previous studies, policymakers should be careful in implementing a tourism-led growth policy ([Dogru & Bulut, 2018](#)).

Besides economic growth, the literature highlights the contribution of tourism to job creation ([Garsous et al., 2017](#)). [Lee and Kang \(1998\)](#) find that tourism creates jobs for both unskilled and semi-skilled labour in South Korea. [Carrascal Incera and Fernández \(2015\)](#) show that the tourism business creates jobs in destination countries. [Banerjee et al. \(2015\)](#) study the effectiveness of a US\$36 million tourism investment in the south of Haiti and observe that this project reduced the unemployment rate by 3%, from 26% to 23%. [Çiçek et al. \(2017\)](#) show that since the 1970s, tourism development in Turkey has offered many job opportunities for women. Overall, the literature agrees that tourism development can make a positive contribution to the economy through employment ([Garsous et al., 2017](#)), investment and production ([Banerjee et al., 2015](#)), and fiscal revenues ([Gooroochurn & Milner, 2005](#)).

Tourism development can create new jobs, including both direct and indirect jobs. Direct jobs are created from service sectors such as hospitality, transportation, food, and beverages, while indirect jobs are created from related sectors to these service sectors, such as the real estate sector. Furthermore, the development of tourism through its consumption can stimulate investment and production, especially in primary products, transportation, food and beverages, and real estate services ([Carrascal Incera & Fernández, 2015](#)). Lastly, tourism development can bring revenue for the fiscal budget, which helps governments to create more space for economic stimulus ([Gooroochurn & Milner, 2005](#)).

Tourism and social issues

Contributions from tourism are observed with respect to social issues, and the impact on inequality and poverty are highlighted. [Vanegas \(2014\)](#) finds that tourism development reduced poverty in five Central American countries between 1980 and 2012. According to [Carrascal Incera and Fernández \(2015\)](#), tourism creates jobs for lower-skilled, lower-wage workers; thus, tourism can reduce income inequality and poverty. This effect is also noticed by C.-K. [Lee and Kang \(1998\)](#) in the case of South Korea. Besides the effect of reducing unemployment, [Banerjee et al. \(2015\)](#) highlight that the tourism investment project in the south of Haiti also decreased the poverty headcount by 1.6 percentage points. [Çiçek et al. \(2017\)](#) note that job creation by tourism for women in Turkey since the 1970s has transformed Turkish society and resulted in socio-economic gains, particularly for women with home jobs. [Lv \(2019\)](#) finds that tourism had a long-term effect of reducing regional inequality in 113 countries between 1995 and 2012. Furthermore, the literature argues that tourism development brings more tax revenue for policymakers ([Gooroochurn & Milner, 2005](#)), which provides them with more space to boost social welfare and reduce inequality. Several studies ([Blake et al., 2008](#)) argue that governments should take into consideration taxation on tourism for better social welfare.

Tourism and environmental issues

With the backdrop of global warming and climate change, the issue of the impact of tourism on the environment has received extra attention in recent years ([Wang et al., 2020](#)). Environmental economics explains that increases in CO₂ emissions are due to economic activities ([Liu & Bae, 2018](#)). The tourism industry is argued as a lower-polluting sector in comparison to others ([Meng et al., 2016](#)). [Gössling et al. \(2012\)](#) observed that direct tourism-related water use is considerably less than 1% of global consumption. J. W. [Lee and Brahmašre \(2013\)](#) find that tourism led to a significant reduction in CO₂ emissions in European Union countries from 1988 to 2009. [Alam and Paramati \(2017\)](#) add that tourism investment not only promotes tourism development, but also helps to reduce CO₂ emissions in ten major tourism countries (Bahamas, Barbados, Belize, Cape Verde, Fiji, the Maldives, Malta, Seychelles, St. Lucia, and Vanuatu). That is, the tourism industry is accurately assessed as a greener industry for the environment.

Furthermore, the literature shows that the tourism industry is a special sector, and investment in the tourism business is negatively influenced by the presence of pollution ([Greiner et al., 2001](#)). Since tourists aspire to visit clean and beautiful places, this influence creates pressure for the tourism industry to reduce pollution and protect the environment as the main input of services ([Robaina-Alves et al., 2016](#)).

Hypothesis construction

In light of previous studies on tourism economics, with positive contributions of tourism to the economy, society, and the environment, this study proposes a link between domestic tourism and economic vulnerability. As expounded above, tourism development contributes positively to economic growth and employment and helps to reduce income inequality and pollution, which all benefit the resilience of the economy from three key aspects: economics, society, and the environment. Thus, the development of domestic tourism can be expected to reduce economic vulnerability. Moreover, tourism economics explains that the decision to travel is linked to employment and income ([Eugenio-Martin, 2003](#)). Domestic tourism is less risky than international tourism due to being less complicated in tour plans and transportation. Tourists do not face differences in cost at destinations, or in language or cultures ([Martins et al., 2017](#)). That is, domestic tourism is less conditional upon external shocks than international tourism, or it may be less vulnerable. Therefore, the first hypothesis can be formed as follows:

H1. Domestic tourism has the impact of reducing the vulnerability of the economy.

There are likely to be different contributions of tourism development to the economy among countries with different income levels. For instance, [Vanegas \(2014\)](#) finds that tourism primarily brought about poverty reduction in Central America (with a relatively low-

income level) in the period 1980–2012. Meanwhile, [Blake et al. \(2008\)](#) indicate positive effects of tourism on income in all groups in Brazil (with a relatively high-income level), but the higher-income groups benefit more than the lowest income groups, which results in income inequality. Furthermore, [Gu et al. \(2017\)](#) find that faster gaming growth in tourism causes higher income inequality in Macao. [Ma et al. \(2019\)](#) show that ecotourism helps alleviate poverty, but gave rise to income inequality in the Qinling Mountains (China) in the period 2015–2017.

Tourism economics points out that employment in tourism, particularly in accommodation and restaurant services, is usually fulfilled by self-employment or family businesses ([Carrascal Incera & Fernández, 2015](#)). A country with a low-income level may benefit more from tourism development, since a low economic development level, low prices of basic products, and high proportions of non- or semi-skilled labour are vividly reflected in low-income countries. That is, tourism development in low-income countries may contribute more substantially to economic growth and inequality reduction, while it has weaker effects on the prices of basic products. Therefore, the second hypothesis is as follows:

H2. The impact of domestic tourism in reducing economic vulnerability may be stronger in countries with lower income levels.

Lastly, the literature also documents the externalities of tourism development, which have recently been under considerable discussion. [Inchausti-Sintes \(2015\)](#) explains that tourism can be an economic boost, but it can also result in Dutch disease. In terms of income inequality, [Carrascal Incera and Fernández \(2015\)](#) argue that tourism can have different effects on income distribution. The literature shows that tourism might induce higher demand for production of, and investment in, basic products such as food and beverages, real estate services, and primary products ([Carrascal Incera & Fernández, 2015](#)), and is the main source of higher prices confronting the poorest households which might then cause greater income inequality ([Carrascal Incera & Fernández, 2015](#)). [Alam and Paramati \(2016\)](#) reveal the increasing impact of tourism on income inequality in a sample of 49 developing economies from 1991 to 2012. In terms of the environment, [Katircioglu \(2014\)](#) detects the long-run equilibrium relationship between tourism, energy consumption, and CO₂ emissions in Turkey. [Saenz-de-Miera and Rosselló \(2014\)](#) emphasise that the number of tourists is a significant predictor of air pollution in Mallorca (Spain). [Sun \(2014\)](#) shows that CO₂ emissions from domestic tourism accounted for 47% of the tourism carbon footprint in the islands. [Tang et al. \(2014\)](#) add that these total CO₂ emissions from the Chinese tourism industry rose with an average annual growth rate of 12.6% in the 1990–2012 period. That is, tourism development may not always be advantageous to economic resilience. Recently, grave concern has been voiced over the externalities of tourism in the trend of mass tourism and overtourism ([Garau-Vadell et al., 2018](#); [Seraphin et al., 2018](#)). That is, the contribution of tourism to reducing economic vulnerability in recent years, may not be effective. Accordingly:

H3. The impact of domestic tourism in reducing economic vulnerability has been faltered in recent years.

Methodology and data

Empirical model

This study investigates the relationship between domestic tourism spending and economic vulnerability. The baseline equation is as follows:

$$EV_{it} = \beta_0 + \beta_1 DoTour_{it} + \beta_2 CONTROL + \delta_t + \gamma_i + \varepsilon_{it} \quad (1)$$

in which, i and t denote for country i at year t ; β is coefficient; ε is residual term; and δ_t and γ_i refer to fixed and time effects, respectively.

- *Dependent variable:* Economic vulnerability (EV) is proxied by EVI.
- *Independent variable:* Domestic tourism spending as a percentage of GDP is used as a proxy for domestic tourism (*DoTour*).
- *Control variables:* The study employs the baseline model of economic vulnerability with four control variables: institutional quality (*Inst*), economic growth (*EG*), trade openness (*TO*), and industrialisation (*Industry*), as proposed by previous studies (e.g., see [Malik and Temple \(2009\)](#), [Barrot Araya et al. \(2016\)](#), [Mathonnat and Minea \(2018\)](#)). Institutional quality represents the quality of the institutional framework. Better institutional quality would provide better social welfare and stability for the economy ([Perera & Lee, 2013](#)). Economic growth denotes economic cycles; a boom cycle may cause higher vulnerability ([Feldkircher, 2014](#)). Trade openness represents the international exposure of the domestic economy. Greater trade openness, therefore, means greater exposure to international shocks and increased vulnerability ([Gnangnon Sena, 2016](#)). The industrial value-added as a percentage of GDP (or the industrialisation process) is used to proxy for the economic structure of the economy. The industrial sector is less vulnerable to natural disasters as they create more work for the labour force, so a reducing effect on vulnerability can be expected. Furthermore, a set of four potential control variables is also added to estimations: inflation (*Inf*), unemployment (*Unem*), urbanisation (*Urban*), and population density (*Popden*). Inflation and unemployment illustrate the instabilities in price level and employment, respectively. Population density represents social demographics, while urbanisation is a proxy for the urbanisation process. These variables are incorporated into Eq. (1), one by one, for sensitivity check.

In an empirical investigation, the study goes further and performs three additional checks. Firstly, the study tries to explore the channels of the effects of domestic tourism to economic vulnerability. To do this, two main components of EVI (the shock sub-index and the exposure sub-index) are collected and used as dependent variables. The detail of the two sub-indices of EVI is presented in the data section. Secondly, the literature shows that tourism development makes a significant positive contribution to the economy, which

Table 1
Variables, definitions, calculations, sources, data availability, and data description.

Variables	Definitions	Calculations	Sources	Availability	Obs	Mean	S.D.	Min	Max
EVI	Economic vulnerability	Economic vulnerability index	FERDI	1995–2018	1231	29.44	9.43	10.10	70.05
Shock	Shock index	The sub-index of EVI (50%)	FERDI	1995–2018	1234	28.45	12.20	2.37	88.17
Exposure	Exposure index	The sub-index of EVI (50%)	FERDI	1995–2018	1261	30.42	9.87	3.41	59.34
Inst	Institutional quality	Average of six institutional indicators	WGIS	2002–2018	1264	-0.32	0.61	-1.75	1.62
EG	Economic growth	Real GDP growth rate (%)	WDIs	1960–2018	1264	4.68	3.38	-20.60	26.42
TO	Trade openness	Trade (% GDP)	WDIs	1960–2018	1264	78.98	47.90	0.17	437.33
Industry	Economic structure	Industrial value added (% GDP)	WDIs	1960–2018	1264	29.47	12.25	4.56	77.41
Inf	Inflation	Inflation, GDP deflator (%)	WDIs	1960–2018	1264	7.45	10.42	-29.69	196.98
Unem	Unemployment	Unemployment ratio (% - ILO estimates)	WDIs	1960–2018	1264	7.16	5.59	0.32	33.47
Urban	Urbanisation	Urban population (% total population)	WDIs	1960–2018	1264	52.71	21.97	14.24	100.00
Popden	Social structure	Log of population density (1000 people per square km)	WDIs	1960–2018	1264	4.16	1.39	0.45	8.98
DoTour	Domestic tourism	Domestic tourism spending to GDP (real price - %)	WTTC & WDIs	1995–2017	1264	3.51	1.89	0.78	15.07
InTour	International tourism	International tourists' spending to GDP (real price - %)	WTTC & WDIs	1995–2017	1246	4.19	4.72	0.03	27.24

Notes: The data of EVI is freely collected from the FERDI (see <https://ferdi.fr/en>), which is the Foundation for studies and Research on International Development; WGIS is Worldwide Governance Indicators database of World Bank with six institutional indicators including Control of Corruption, Rule of Law, Government Effectiveness, Regulatory Quality, Voice and Accountability, Political Stability and Absence of Violence; WDIs is World Development Indicators database, World Bank (WDIs); the data of domestic tourism is collected from World Travel & Tourism Council (WTTC); most variables have full data until 2017.

may lead to a decrease in economic vulnerability as per our hypothesis. However, recent concerns are raised as to mass tourism, which leads to several socio-economic consequences (Garau-Vadell et al., 2018; Seraphin et al., 2018). Domestic tourism spending at a low level can be a good factor in reducing economic vulnerability, but it may start to increase vulnerability if it is over a hurdle level; that is, there may be a U-shape relationship between domestic tourism spending and EVI. The study checks for this effect by putting the square term of domestic tourism spending in estimations. Lastly, international tourism is also raised, with several contributions to the economy, but it is argued that it has the features of an export sector. That is, the impact of domestic tourism spending and international tourism receipt on economic vulnerability may be different; this difference is also a very interesting point for policymakers. Therefore, the study includes international visitor spending (*InTour*) in estimations, to investigate.

Data

The study collects data from four sources. The EVI suggested by Feindouno and Goujon (2016) is collected from <https://ferdi.fr/en> to proxy for economic vulnerability. EVI is available for 145 countries over the period 1990–2018. Following the method of Feindouno and Goujon (2016), there are two main sub-indices of EVI; shock index and exposure index, where each sub-index contributes a half weight to the EVI. This study recruits the two sub-indices of EVI as additional dependent variables in empirical investigations; doing so can help to detect the effects of domestic tourism spending on economic vulnerability as a shock or component to the exposure and resilience of the economy.

In terms of tourism, domestic tourism spending data (in real prices) is collected from the World Travel and Tourism Council (WTTC) and then divided for real GDP from the World Development Indicators (WDI) of the World Bank to form the domestic tourism spending as a percentage of GDP to proxy for domestic tourism. Visitor spending (US\$ billion - real prices) is also collected from WTTC and divided for real GDP to proxy for international tourism. The data for tourism from 1995 to 2017 is mostly available.

In terms of control variables, six institutional indicators: control of corruption; rule of law; government effectiveness; regulatory quality; political stability; and absence of violence, voice, and accountability, are collected from the Worldwide Governance Indicators (WGI) of the World Bank. The mean of the six institutional indicators is calculated to proxy for overall institutional quality. The WGI data is available annually from 2002 to 2018. Real GDP growth rate (%), trade (% of GDP), industry value-added (% of GDP), inflation (GDP deflator -%), unemployment ratio (% - ILO estimates), urban population (% total population), and log of population density (1000 people per square km), are collected from the WDI to proxy for economic growth, trade openness, economic structure, inflation, unemployment, urbanisation, and social demographics, respectively. This data is mostly available for all countries, up to 2017. Variables, definitions, calculations, sources, availability, and data descriptions are presented in Table 1.

All variables are combined, matched together, and controlled for time availability. Since the data on institutional quality is available for each year from 2002, while the data on tourism is mostly available to 2017, the best period is 2002–2017. With this timeframe, countries with missing data are dropped from the sample. The data of 145 countries from www.ferdi.fr is filtered to the final sample of the 79 countries as the most suited panel sample (see Table A1, Appendix, for the list of countries).³ The full sample is

³ There is missing data in other variables (mostly in EVI, trade openness, industry value-added, domestic tourism spending). The detail on full list of 145 countries from www.ferdi.fr, the dropped countries and reason can be provided upon requests.

Table 2
Correlation matrix.

Correlation	EVI	Inst	EG	TO	Industry	Inf	Unem	Urban	Popden	DoTour
EVI	1.00									
Inst	-0.16***	1.00								
p-Value	0.00									
EG	0.09***	-0.14***	1.00							
p-Value	0.00	0.00								
Trade	0.04	0.41***	0.02	1.00						
p-Value	0.20	0.00	0.41							
Industry	-0.27***	-0.05*	-0.02	0.19***	1.00					
p-Value	0.00	0.08	0.52	0.00						
Inf	0.13***	-0.20***	0.10***	-0.10***	0.05**	1.00				
p-Value	0.00	0.00	0.00	0.05						
Unem	-0.05	0.14***	-0.21***	0.04	0.23***	0.02	1.00			
p-Value	0.11	0.00	0.00	0.12	0.00	0.51				
Urban	-0.43***	0.53***	-0.23***	0.25***	0.36***	-0.08***	0.22***	1.00		
p-Value	0.00	0.00	0.00	0.00	0.00	0.00	0.00			
Popden	-0.16***	0.12***	0.01	0.19***	-0.22	-0.09***	-0.31***	-0.13***	1.00	
p-Value	0.00	0.00	0.77	0.00	0.00	0.00	0.00	0.00		
DoTour	-0.18***	0.07***	-0.02	-0.04	-0.10***	-0.03	-0.06**	0.06**	0.10***	1.00
p-Value	0.00	0.01	0.50	0.16	0.00	0.25	0.03	0.04	0.00	

* Significance level at 10%.

** Significance level at 5%.

*** Significance level at 1%.

divided into two sub-samples of 43 LMCs and 36 UHCs (see Table A2, Appendix, for the data description of each subsample). Table 2 reports the correlation matrix among variables, displaying the significant negative correlation between domestic tourism spending and EVI (-0.18).⁴ There may be an issue of multi-collinearity among variables such as urbanisation and institutional quality (correlation value is 0.53), or trade openness and institutional quality (correlation is 0.41). Therefore, the variance inflation factor (VIF) is estimated to check this. The results of VIF are reported in Table A4, with no evidence of multi-collinearity (all VIF are less than 10). Table A3, Appendix, shows that the correlation between domestic tourism and EVI is negative and significant in LMCs, but that this is not the case in UHCs.

Econometric estimations

There are possible effects of economic vulnerability on economic factors such as economic growth or unemployment (Ferrarini & Hummels, 2014), which may cause the problem of endogeneity. Meanwhile, since our sample features panel data with large N (79 countries) in a short time T (16 years, 2002–2017), the two-step system GMM (Blundell & Bond, 1998) is used as the main estimator to deal with endogeneity. Windmeijer (2005) indicates that the two-step GMM estimator uses the true values of the parameters to calculate the efficient weight matrix. Thus, the two-step GMM estimator shows the corrected variance estimate approximating to the finite sample variance, thus leading to more accurate inference. The dataset features panel data with various countries, and we consider countries' fixed characteristics such as socio-economic and geographical factors, which can influence the true effects of domestic tourism spending on EVI. Following Kripfganz and Schwarz (2019), we employ SELPDM as a recent advance on the GMM technique to check the robustness of the two-step system GMM. The SELPDM approach is more robust against misspecification than GMM estimators since this approach obtains all the coefficients of time-invariant variables. Furthermore, each control variable is added one by one in the GMM estimates to check for the sensitivity of the results.

Interestingly, it is conceivable that there are cross-sectional dependence and heteroscedasticity in our samples. The study employs PCSE (Bailey & Katz, 2011) and FGLS (Liao & Cao, 2013) as alternatives to deal with cross-sectional dependence and heteroscedasticity, respectively. A series of traditional estimates, i.e. pooled OLS, robust pooled OLS, pooled OLS with year effects, pooled OLS with group effects,⁵ and pooled OLS with area effects,⁶ are also recruited for robustness checks. Finally, to estimate the long-run effects appropriately, FMOLS and CCR are used.⁷

⁴ There is surprising negative correlation between population density and urbanisation (-0.13). The calculation of population density is the logarithm of population density (1000 people per square km), and the growth rate of population density and urbanisation in our sample (mostly developing countries) is not positively correlated. We have checked the correlation between population density (1000 people per square km) and urbanisation; it is 0.1962 as an expectation.

⁵ There are two subgroups in the sample: LMCs and UHCs.

⁶ There are six areas in the sample, namely East Asia & Pacific, South Asia, Europe & Central Asia, Middle East & North Africa, Sub-Saharan Africa, and Latin America & Caribbean.

⁷ The results of pooled OLS, robust pooled OLS, pooled OLS with year effects, pooled OLS with group effects, and pooled OLS with area effects are provided upon request.

Table 3
Domestic tourism and economic vulnerability.

Dep. var: <i>EVI</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Estimator:	Twostep system GMM	Twostep system GMM	Twostep system GMM	Twostep system GMM	Twostep system GMM	SLEPDM	FGLS	PCSE
Inst	−4.400*** [0.476]	−4.230*** [0.551]	−4.938*** [0.517]	0.708* [0.643]	0.218 [0.534]	−0.885 [1.353]	−0.180 [0.488]	−0.180 [0.218]
EG	0.212*** [0.020]	0.148*** [0.017]	0.195*** [0.022]	0.017** [0.008]	0.035*** [0.011]	−0.047 [0.038]	−0.068 [0.068]	−0.068 [0.085]
TO	0.010*** [0.004]	0.012*** [0.003]	0.019*** [0.004]	0.018*** [0.003]	0.036*** [0.003]	0.046*** [0.009]	0.054*** [0.005]	0.054*** [0.003]
Industry	−0.219*** [0.025]	−0.239*** [0.022]	−0.245*** [0.025]	−0.101*** [0.021]	−0.174*** [0.019]	−0.161*** [0.061]	−0.196*** [0.021]	−0.196*** [0.015]
Inf		0.073*** [0.007]	0.064*** [0.007]	0.072*** [0.007]	0.071*** [0.006]	0.058*** [0.022]	0.102*** [0.021]	0.102*** [0.046]
Unem			0.183*** [0.050]	0.171*** [0.030]	0.022 [0.039]	0.096 [0.088]	0.001 [0.043]	0.001 [0.025]
Urban				−0.184*** [0.017]	−0.176*** [0.015]	−0.177*** [0.032]	−0.186*** [0.013]	−0.186*** [0.007]
Popden					−2.029*** [0.210]	−2.036*** [0.447]	−2.056*** [0.174]	−2.056*** [0.039]
DoTour	−0.933*** [0.148]	−0.973*** [0.137]	−0.865*** [0.123]	−0.897*** [0.137]	−0.742*** [0.111]	−0.620*** [0.238]	−0.684*** [0.115]	−0.684*** [0.077]
Constant	35.32*** [0.835]	36.09*** [0.796]	33.68*** [0.979]	42.44*** [1.192]	51.59*** [1.248]	49.48*** [3.164]	51.35*** [1.390]	51.35*** [0.631]
N	1156	1156	1156	1156	1156	1231	1231	1231
R-squared								0.352
No. of countries	79	79	79	79	79	79	79	79
No. of IVs	62	63	64	65	66	24		
AR(2) test – p-value	0.720	0.938	0.985	0.744	0.812	0.1169		
Hansen test – p-value	0.185	0.219	0.257	0.415	0.154	0.1634		

Notes: standard errors are in [].

* Significance level at 10%.

** Significance level at 5%.

*** Significance level at 1%.

Table 4
Domestic tourism and economic vulnerability: two subsamples.

Dep. var: <i>EVI</i>	(1)	(2)	(3)	(4)
Groups	LMCs		UHCS	
Estimator:	Twostep system GMM	SELPDM	Twostep system GMM	SELPDM
Inst	0.172* [0.902]	-0.042 [1.608]	0.919 [0.714]	2.060 [1.332]
EG	-0.003 [0.044]	0.088 [0.086]	-0.156*** [0.019]	-0.163*** [0.051]
TO	0.062*** [0.009]	0.061*** [0.019]	0.080*** [0.004]	0.059*** [0.007]
Industry	-0.307*** [0.045]	-0.340*** [0.093]	-0.093*** [0.027]	-0.013 [0.055]
Inf	0.086*** [0.009]	0.094*** [0.016]	0.063*** [0.007]	0.039 [0.029]
Unem	0.203*** [0.053]	0.363** [0.148]	-0.041 [0.058]	-0.051 [0.113]
Urban	-0.110*** [0.032]	-0.083 [0.056]	-0.130*** [0.018]	-0.141*** [0.027]
Popden	-0.609 [0.384]	-0.033 [0.611]	-3.110*** [0.303]	-3.517*** [0.597]
DoTour	-1.370*** [0.252]	-1.488*** [0.293]	0.011 [0.136]	0.002 [0.390]
Constant	46.71*** [1.427]	42.93*** [3.509]	42.88*** [2.535]	44.76*** [5.325]
N	625	665	531	566
No. of countries	43	43	36	36
No. of IVs	38	24	38	24
AR(2) test – p-value	0.562	0.515	0.586	0.267
Hansen test – p-value	0.244	0.537	0.523	0.323

Notes: standard errors are in [].

* Significance level at 10%.

** Significance level at 5%.

*** Significance level at 1%.

Results and discussion

Basic results

The basic results are presented in Table 3. Specifically, the results of the AR(2) test and Hansen test for the two-step system GMM and SELPDM are statistically insignificant, which confirms the consistent and unbiased nature of the estimates. Moreover, other estimates show consistent findings.

Table 3 presents the influence of domestic tourism spending on EVI for the global sample of 79 countries. The results show that domestic tourism spending significantly reduces EVI across different estimates (Model 6 to Model 13), and also when each control variable is added one by one (Model 1 to Model 5). The impact of domestic tourism in reducing EVI is also reaffirmed in the long-run by FMOLS and CCR estimates (see Models 1 and 2 in Table A4, Appendix). This result verifies our first hypothesis that the development of domestic tourism helps reduce the vulnerability of the economy. This work is the first proper attempt in the literature to link tourism development to the overall vulnerability of the economy. The results underline the positive contribution of domestic tourism to economic growth (Lee & Brahmaresne, 2013), inequality reduction (Carrascal Incera & Fernández, 2015), and environment protection (Alam & Paramati, 2017), which demonstrate a positive impact, especially on economic resilience. These results reinforce the global evidence on the positive impact of domestic tourism, thereby giving weight to the adoption of a tourism-led growth policy (Dogru & Bulut, 2018). Furthermore, the results suggest that governments should bring domestic tourism into greater focus, to serve as a sound policy rather than centre on international arrivals, which exhibit greater vulnerability.

Regarding control variables, observations show that the coefficient of trade openness is positive and significant, suggesting that an increase in trade openness would raise economic vulnerability, which is the same finding as Cavallo and Frankel (2008) and Gnanon Sena (2016). The coefficient of economic structure is found to be negative and significant, suggesting economic transformation slightly contributes to the reduction in economic vulnerability, which is opposite to the study of D. Lee and Lim (2019). Observations show that urbanisation and population density significantly lower economic vulnerability, implying that progress in urbanisation could slightly reduce economic vulnerability. This result is different from the study of Choi (2016). Regarding inflation, we find that an increase in inflation could raise economic vulnerability, as found in Morales (1994). Interestingly, observations show that economic growth and institutions have heteroscedastic effects on economic vulnerability, suggesting that the relationship between these variables would need to be verified by further empirical research (Cordina, 2004).

Table 5
Domestic tourism and economic vulnerability: three periods.

Dep. var: <i>EVI</i>	(1)	(2)	(3)	(4)	(5)	(6)
Period:	2002–2007		2008–2012		2013–2017	
Estimator:	Twostep system GMM	SELPDM	Twostep system GMM	SELPDM	Twostep system GMM	SELPDM
Inst	−1.382 [1.643]	−0.573 [1.553]	0.391 [1.883]	−0.280 [1.944]	1.254 [1.828]	−0.087 [2.069]
EG	−0.460** [0.183]	−0.210 [0.184]	−0.024 [0.033]	−0.046 [0.062]	−0.096 [0.070]	−0.233* [0.132]
TO	0.085*** [0.028]	0.067*** [0.015]	0.023* [0.013]	0.039*** [0.013]	0.035 [0.023]	0.057*** [0.013]
Industry	−0.213*** [0.070]	−0.200** [0.080]	−0.099 [0.074]	−0.242** [0.094]	−0.141 [0.095]	−0.197* [0.104]
Inf	0.065*** [0.017]	0.085*** [0.028]	0.007 [0.017]	0.031 [0.042]	0.068** [0.027]	0.104** [0.047]
Unem	−0.103 [0.083]	−0.037 [0.091]	0.029 [0.140]	0.143 [0.141]	0.016 [0.137]	0.058 [0.163]
Urban	−0.214*** [0.036]	−0.206*** [0.038]	−0.246*** [0.040]	−0.182*** [0.044]	−0.192*** [0.038]	−0.178*** [0.049]
Popden	−2.805*** [0.486]	−2.456*** [0.489]	−2.495*** [0.573]	−1.880*** [0.554]	−2.182*** [0.469]	−2.078*** [0.643]
DoTour	−1.059* [0.599]	−0.663** [0.337]	−0.584** [0.279]	−0.881*** [0.316]	−0.395 [0.270]	−0.514 [0.326]
Constant	58.34*** [3.832]	54.21*** [3.573]	55.88*** [4.251]	53.28*** [4.195]	50.98*** [3.653]	50.17*** [4.130]
N	378	453	383	383	395	395
No. of countries	76	76	79	79	79	79
No. of IVs	26	18	19	14	19	14
AR(2) test – p-value	0.786	0.482	0.769	0.238	0.002	0.070
Hansen test – p-value	0.837	0.904	0.162	0.687	0.691	0.426

Notes: standard errors are in [].

* Significance level at 10%.

** Significance level at 5%.

*** Significance level at 1%.

Results for the two sub-samples

In this section, we group the sample into two sub-samples. The influence of domestic tourism on EVI for the two sub-samples is presented in Table 4. The Hansen *J* test shows that instruments are not over-identified. The Arellano-Bond test, AR (2), indicates that these models reveal no serial autocorrelation.

An interesting finding is that domestic tourism spending is documented as having the effect of significantly reducing EVI in LMCs, while non-significantly increasing EVI in UHCs. The results are reaffirmed by long-run estimates in Table A4, Appendix (Model 3 to Model 6). The results not only confirm our second hypothesis, that the negative relationship between domestic tourism and EVI is stronger in LMCs than in UHCs, but also show that the development of domestic tourism can cause vulnerability in UHCs; this may be because the tourism industry in UHCs faces strong price competition from LMCs, especially to the detriment of the labour-intensive nature of tourism and the high wage costs in UHCs. Also, tourism faces competition with high growth products/services which occupy greater importance in household spending, such as electronic devices and ICT services. Recently, these sectors have grown more sharply than tourism in UHCs (OECD, 2010, 2020). Thus, the tourism industry may fail to reduce EVI in UHCs. These results add new evidence to the literature on differences in the contribution of tourism to the economy among countries with different income levels (e.g., see Vanegas (2014) versus Blake et al. (2008), Ma et al. (2019)). Governments in UHCs should therefore exercise due caution when it comes to adopting tourism-led growth strategies. Meanwhile, the results support the use of tourism as a tool for economic stimulation by governments in LMCs.

To check further the impact of domestic tourism spending on EVI by income level, the study collects real GDP per capita from WDI and takes logarithms to proxy for income level (*Income*). The estimates for both income level and the interaction between domestic tourism spending and income level are reported in Table A6 (Appendix), as a robustness check. The results show that all findings are consistent. The effect of domestic tourism spending is negative on EVI, while the interaction between domestic tourism spending and income level is found to be positive; this means that the effect of domestic tourism spending in reducing EVI is weaker for countries with higher income levels. This result is consistent with our findings, that domestic tourism spending has a positive and non-significant effect in UHCs (upper- and high-income countries) of increasing EVI (see Table 4). Moreover, the effects of domestic tourism spending on EVI may be different across the development levels of the tourism industry. The study further checks for robustness by calculating the ratio of total values of international tourist spending and domestic tourism spending to real GDP as an indicator of the size of the tourism industry spending to GDP. Its average value is 7.635% GDP. Since this total value of the tourism industry includes the value of domestic tourism spending, we do not create the interaction between domestic tourism spending and total tourism spending, as in the case of income level. Instead, based on the average value of 7.635%, we divide our sample into two sub-samples, consisting of countries

Table 6
Domestic tourism and economic vulnerability: two sub-indices of EVI.

Dep. var:	Shock index				Exposure index			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Model	Twostep system		PCSE		Twostep system		PCSE	
Estimator:	GMM	SLEPDM	FGLS	PCSE	GMM	SLEPDM	FGLS	PCSE
Inst	-1.762*** [0.627]	-4.312** [1.689]	-3.354*** [0.628]	-3.354*** [0.346]	2.754*** [0.558]	2.581** [1.193]	3.244*** [0.527]	3.244*** [0.205]
EG	0.033* [0.018]	0.086 [0.060]	0.148* [0.087]	0.148 [0.133]	-0.160*** [0.013]	-0.230*** [0.052]	-0.293*** [0.073]	-0.293*** [0.099]
TO	0.028*** [0.004]	0.030** [0.013]	0.039*** [0.007]	0.039*** [0.003]	0.057*** [0.005]	0.063*** [0.009]	0.065*** [0.006]	0.065*** [0.002]
Industry	-0.294*** [0.029]	-0.273*** [0.075]	-0.334*** [0.027]	-0.334*** [0.018]	-0.081*** [0.025]	-0.108** [0.054]	-0.051** [0.023]	-0.051*** [0.010]
Inf	0.109*** [0.008]	0.036 [0.032]	0.136** [0.027]	0.136** [0.064]	0.053*** [0.006]	0.069*** [0.017]	0.061*** [0.023]	0.061** [0.031]
Unem	-0.016 [0.046]	0.100 [0.101]	0.022 [0.055]	0.022 [0.030]	0.101 [0.066]	0.068 [0.103]	-0.020 [0.047]	-0.020 [0.024]
Urban	-0.222*** [0.019]	-0.169*** [0.043]	-0.183*** [0.017]	-0.183*** [0.019]	-0.155*** [0.019]	-0.151*** [0.031]	-0.190*** [0.015]	-0.190*** [0.005]
Popden	-1.355*** [0.282]	-1.146** [0.564]	-1.335*** [0.224]	-1.335*** [0.099]	-2.182*** [0.284]	-2.661*** [0.489]	-2.644*** [0.188]	-2.644*** [0.074]
DoTour	-0.527*** [0.141]	-0.801** [0.316]	-0.590*** [0.148]	-0.590*** [0.115]	-0.610*** [0.192]	-0.639*** [0.235]	-0.741*** [0.126]	-0.741*** [0.048]
Constant	52.79*** [1.793]	48.29*** [3.390]	49.73*** [1.787]	49.73*** [1.363]	47.78*** [1.755]	50.55*** [3.656]	52.45*** [1.512]	52.45*** [0.638]
N	1158	1234	1234	1234	1183	1261	1261	1261
R-squared				0.360				0.288
No. of countries	79	79	79	79	79	79	79	79
No. of IVs	66	24			64	38		
AR(2) test – p-value	0.922	0.162			0.197	0.850		
Hansen test – p-value	0.307	0.376			0.303	0.076		

Notes: standard errors are in [].

* Significance level at 10%.

** Significance level at 5%.

*** Significance level at 1%.

with a large tourism industry and countries with small tourism industry:

If the total tourism spending < 7.635%GDP, countries have a small tourism industry; otherwise
 If the total tourism spending ≥ 7.635%GDP, countries have a large tourism industry

The results are reported in Table A8, and show that domestic tourism spending has the effect of consistently reducing EVI in both development levels of the tourism industry.

Results for three sub-periods

In this part, we estimate the influence of domestic tourism on EVI for three sub-periods: 2002–2007, 2008–2012, and 2013–2017, respectively. The estimation results are presented in Table 5. The Hansen J test reveals that instruments are not over-identified. The Arellano-Bond test, AR (2), shows that these models have no serial autocorrelation.

The results show a statistically significant effect of domestic tourism spending reducing EVI in the periods 2002–2007 and 2008–2012, while this impact is statistically non-significant in the 2013–2017 period. The results verify our third hypothesis that the effect of domestic tourism in reducing economic vulnerability may have become weaker in recent years. This result reflects the rapid development of tourism turning into over-tourism or mass tourism in these years (Garau-Vadell et al., 2018; Seraphin et al., 2018), indicating that tourism development may not be a feasible strategy for economic resilience. Additionally, the effect of domestic tourism reducing EVI in the period 2007–2012 indicates that tourism can be highly advantageous in the struggle against crises, as suggested in previous literature (see Jucan and Jucan (2013)).

Interestingly, domestic tourism is found to fail in reducing economic vulnerability in the period 2013–2017; this is because the tourism industry has to operate in the context of the new global economy. That is, the digital revolution promotes the empowerment of the consumer in rapidly accessing of global knowledge via the Internet and ensures that external shocks (namely, contagious disease threats to global health such as SARS, H1N, Covid-19...) which would increase commodity price fluctuations through changes in demand for travel and tourism products from international markets, now take place instantly. Therefore, the tourism industry, of course, has to face this challenge, thus leading to an increase in its vulnerable impact on economic activities (OECD, 2020). This point

Table 7
Domestic tourism and economic vulnerability: two sub-indices of EVI for two subsamples and three sub-periods.

Model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Groups and periods	LMCs		UHCs		2002–2007		2008–2012		2013–2017	
Dep. var:	<i>Shock index</i>	<i>Exposure index</i>	<i>Shock index</i>	<i>Exposure index</i>	<i>Shock index</i>	<i>Exposure index</i>	<i>Shock index</i>	<i>Exposure index</i>	<i>Shock index</i>	<i>Exposure index</i>
Inst	0.566 [0.858]	0.179 [0.624]	-4.065*** [0.714]	4.640*** [1.006]	-3.543 [2.261]	1.430 [1.405]	-3.494 [2.173]	3.310*** [0.528]	0.489 [3.164]	1.880 [1.928]
EG	0.220*** [0.058]	0.059* [0.034]	-0.170*** [0.027]	-0.125*** [0.017]	-0.436** [0.191]	-0.002 [0.061]	-0.004 [0.056]	-0.173*** [0.010]	0.160* [0.087]	-0.329*** [0.109]
TO	0.049*** [0.014]	0.025** [0.010]	0.075*** [0.006]	0.093*** [0.006]	0.093** [0.037]	0.037* [0.022]	0.016 [0.015]	0.040*** [0.004]	-0.020 [0.032]	0.076*** [0.026]
Industry	-0.476*** [0.049]	-0.108*** [0.036]	-0.171*** [0.026]	-0.016 [0.026]	-0.398*** [0.082]	-0.026 [0.092]	-0.309*** [0.093]	-0.025 [0.018]	-0.097 [0.128]	-0.086 [0.092]
Inf	0.112*** [0.010]	0.049*** [0.006]	0.085*** [0.011]	0.018** [0.009]	0.089*** [0.024]	0.048*** [0.018]	0.012 [0.023]	0.027*** [0.003]	0.095** [0.047]	0.008 [0.024]
Unem	0.194*** [0.062]	0.218*** [0.058]	0.158* [0.078]	-0.145 [0.104]	-0.131 [0.095]	0.129 [0.111]	0.151 [0.162]	-0.373*** [0.051]	0.013 [0.173]	0.149 [0.199]
Urban	-0.079 [0.049]	-0.085** [0.036]	-0.128*** [0.019]	-0.130*** [0.027]	-0.222*** [0.046]	-0.121** [0.048]	-0.219*** [0.052]	-0.152*** [0.012]	-0.221*** [0.055]	-0.185*** [0.050]
Popden	-0.065 [0.549]	-1.515*** [0.355]	-1.786*** [0.401]	-4.577*** [0.445]	-2.091*** [0.694]	-1.528*** [0.571]	-1.223 [0.781]	-2.754*** [0.199]	-0.992 [0.723]	-3.081*** [0.646]
DoTour	-1.727*** [0.320]	-1.014*** [0.273]	0.331*** [0.117]	-0.292 [0.317]	-1.548* [0.885]	-0.863** [0.372]	-0.823* [0.423]	-1.692*** [0.146]	-0.411 [0.443]	-0.507* [0.299]
Constant	49.83*** [2.458]	44.23*** [2.018]	34.67*** [2.273]	50.82*** [4.381]	60.23*** [4.686]	43.89*** [3.568]	53.62*** [5.110]	57.64*** [1.606]	48.17*** [5.851]	51.74*** [4.918]
N	627	643	531	540	380	393	383	395	395	395
No. of countries	43	43	36	36	76	79	79	79	79	79
No. of IVs	38	38	38	38	26	26	19	74	19	19
AR(2) test – p-value	0.737	0.208	0.422	0.847	0.907	0.457	0.722	0.691	0.081	0.561
Hansen test – p-value	0.333	0.259	0.672	0.547	0.937	0.259	0.373	0.274	0.624	0.329

Notes: twostep system GMM estimate; standard errors are in [].

* Significance level at 10%.

** Significance level at 5%.

*** Significance level at 1%.

Table 8
Domestic tourism and Economic vulnerability: non-linear effects.

Dep. var: EVI	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Full sample	LMCs	UHCs	2002–2007	2008–2012	2013–2017
Inst	0.630 [0.524]	0.072 [0.945]	1.101 [0.828]	−1.185 [1.638]	0.215 [1.955]	1.302 [1.846]
EG	0.024** [0.010]	0.058 [0.046]	−0.164*** [0.021]	−0.542*** [0.203]	−0.026 [0.034]	−0.107 [0.070]
TO	0.037*** [0.003]	0.053*** [0.008]	0.081*** [0.005]	0.082*** [0.028]	0.026** [0.012]	0.036 [0.024]
Industry	−0.171*** [0.017]	−0.326*** [0.048]	−0.093*** [0.026]	−0.230*** [0.067]	−0.106 [0.073]	−0.134 [0.100]
Inf	0.074*** [0.005]	0.088*** [0.009]	0.062*** [0.009]	0.074*** [0.019]	0.005 [0.017]	0.071** [0.028]
Unem	0.036 [0.039]	0.249*** [0.058]	−0.040 [0.051]	−0.047 [0.077]	0.043 [0.137]	0.018 [0.140]
Urban	−0.186*** [0.015]	−0.094** [0.036]	−0.138*** [0.027]	−0.228*** [0.036]	−0.243*** [0.041]	−0.196*** [0.038]
Popden	−1.895*** [0.230]	−0.598 [0.417]	−3.119*** [0.288]	−2.516*** [0.498]	−2.491*** [0.570]	−2.233*** [0.468]
DoTour	−1.501*** [0.283]	−2.586*** [0.530]	−0.428 [0.656]	−3.126** [1.489]	−0.883 [1.030]	−0.852 [0.744]
DoTour ²	0.080*** [0.023]	0.127*** [0.033]	0.049 [0.070]	0.271* [0.145]	0.036 [0.095]	0.042 [0.050]
Constant	52.851*** [1.144]	48.697*** [1.398]	44.142*** [3.300]	61.836*** [4.068]	56.011*** [5.209]	52.118*** [4.115]
N	1156	625	531	378	383	395
No. of countries	79	43	36	76	79	79
No. of IVs	67	39	39	27	20	20
AR(2) test – p-value	0.940	0.478	0.558	0.918	0.666	0.003
Hansen test – p-value	0.148	0.287	0.538	0.787	0.166	0.606

Notes: twostep system GMM estimate; standard errors are in [].

* Significance level at 10%.

** Significance level at 5%.

*** Significance level at 1%.

is crucial for policymakers to take into account, since the economy is likely more vulnerable in crisis periods (Feldkircher, 2014), while the effect of domestic tourism still matters in reducing economic vulnerability in crises.

Results for sub-indices of economic vulnerability (EVI)

The study investigates the impacts of domestic tourism on two sub-indices of EVI; namely the shock index and the exposure index. The results are presented in Table 6, showing consistent and significant effects of domestic tourism spending reducing the shock index (Models 1 to 4) and exposure index (Models 5 to 8) for the full sample. This result means that domestic tourism development would help improve the resilience of the economy (by reducing the exposure index), while it also reduces the size and likelihood of shocks in the economy.

Taking a further step to the effects of domestic tourism spending on the two sub-indices of EVI in the two sub-samples (LMCs and UHCs) and three sub-periods, the results of Table 7 show some interesting findings. First, domestic tourism spending is found to have a significant impact in reducing both the shock index and exposure index in LMEs, while it has a significant impact in increasing the shock index in UHCs but a non-significant impact in reducing the exposure index in UHCs. The former finding suggests that domestic tourism spending fails to reduce EVI in UHCs, as it has the effect of increasing the shock index (or size and likelihood of shocks in the economy). Second, regarding the three sub-periods, the results show that domestic tourism spending has the significant impact of reducing the two sub-indices of EVI in the periods 2002–2007 and 2008–2012, while it has the impact (at 10% statistical significance) of reducing the exposure index in the period 2013–2017. Once again, this asserts the ineffectiveness of domestic tourism spending in reducing EVI in the period 2013–2017, as found in previous results.

Non-linear effects of domestic tourism

The estimation for the non-linear effects of domestic tourism on EVI is presented in Table 8. The results show that domestic tourism spending has a significant impact in reducing EVI, while its square term has a significant impact in increasing EVI for the full sample and LMCs, as well as in the period 2002–2007. This result means that there is a U-shape relationship between domestic tourism spending and EVI. That is, domestic tourism development from an initial low level would bring benefits to the economy due to the reduction of economic vulnerability, but mass tourism beyond a hurdle rate would cost the resilience of the economy. The results also show that the effect of domestic tourism spending is non-significant in reducing EVI, while its square term is found to have a non-

Table 9

Domestic tourism and economic vulnerability: the comparison with International tourism receipts.

Dep. var: EVI	(1)	(2)	(3)	(4)	(5)	(6)
Sample	Full sample	LMCs	UHCs	2002–2007	2008–2012	2013–2017
Inst	−0.247 [0.397]	−1.090 [0.717]	0.976 [0.679]	−0.301 [1.541]	−0.520 [1.956]	0.953 [1.866]
EG	−0.093*** [0.009]	−0.078* [0.043]	−0.162*** [0.020]	−0.134 [0.126]	−0.030 [0.035]	−0.074 [0.071]
TO	0.037*** [0.003]	0.077*** [0.012]	0.078*** [0.005]	0.043* [0.022]	0.024* [0.013]	0.032 [0.026]
Industry	−0.165*** [0.019]	−0.331*** [0.046]	−0.053** [0.024]	−0.160** [0.077]	−0.114 [0.074]	−0.144 [0.099]
Inf	0.079*** [0.005]	0.092*** [0.008]	0.061*** [0.009]	0.071*** [0.012]	0.013 [0.017]	0.088*** [0.031]
Unem	−0.014 [0.036]	0.212*** [0.072]	−0.063 [0.070]	−0.047 [0.075]	0.005 [0.140]	−0.033 [0.133]
Urban	−0.190*** [0.017]	−0.064** [0.029]	−0.131*** [0.024]	−0.177*** [0.035]	−0.224*** [0.040]	−0.187*** [0.037]
Popden	−2.002*** [0.185]	−0.077 [0.308]	−3.259*** [0.317]	−2.343*** [0.526]	−2.455*** [0.564]	−2.189*** [0.441]
DoTour	−0.744*** [0.096]	−1.771*** [0.221]	0.084 [0.204]	−0.719* [0.385]	−0.702** [0.285]	−0.416 [0.283]
InTour	0.104*** [0.020]	0.226** [0.091]	0.122* [0.065]	0.048 [0.236]	0.215 [0.152]	0.033 [0.117]
Constant	51.820*** [1.189]	42.374*** [1.700]	41.906*** [3.064]	52.894*** [3.597]	54.579*** [4.276]	51.087*** [3.709]
N	1139	608	531	373	377	389
No. of countries	78	42	36	75	78	78
No. of IVs	67	39	15	27	20	20
AR(2) test – p-value	0.895	0.311	0.531	0.784	0.726	0.001
Hansen test – p-value	0.402	0.346	0.471	0.293	0.174	0.666

Notes: *InTour* is percentage of international tourists' spending per real GDP (%); twostep system GMM estimate; standard errors are in [].

* Significance level at 10%.

** Significance level at 5%.

*** Significance level at 1%.

significant impact in increasing EVI for UHCs, and the two periods of 2008–2012 and 2013–2017.

Lastly, a comparison between domestic tourism and international tourism is investigated. The estimation with the inclusion of international tourism receipts is presented in Table 9. The results show an interesting finding, that domestic tourism spending has a significant effect in reducing EVI for the full sample and LMCs, as well as the two periods of 2002–2007 and 2008–2012; while international tourism has a significant effect of increasing EVI for the full sample and two sub-samples. This means that domestic tourism and international tourism have opposite effects on economic resilience. While domestic tourism can be good for improving this resilience, international tourism (as a feature of the export sector) can increase the vulnerability of the economy.

Conclusion

Tourism development is argued to contribute positively to the economy through, for instance, economic development, job creation, investment, inequality reduction, and environment protection. In contrast, it is also documented with externalities such as Dutch disease, increased income inequality, and primary source of pollution. This study is based materially on an interdisciplinary framework in investigating the influence of domestic tourism spending on the vulnerability of the economy. In this study, the new index of economic vulnerability—the economic vulnerability index by Feindouno and Goujon (2016), which captures the three main aspects of instabilities (i.e. economic instability, social instability, and environmental instability)—is used to proxy for economic vulnerability.

The empirical work is conducted for a global sample of 79 countries over the period 2002–2017, based on the availability of data. In the estimations, properly controlled are institutional quality, economic growth, trade openness, economic structure, and other factors such as inflation, unemployment, urbanisation, and population density. The two-step system GMM is applied as the main estimator to deal with endogeneity, as commonly reflected in large N and short T panel data. Several econometric techniques are also recruited to check for the robustness and sensitivity of the findings. The empirical results provide three interesting findings.

First, domestic tourism spending (as a % of GDP) is found to have a significant impact in reducing EVI. The results are robust for two sub-indices of EVI, namely shock index and exposure index. The results suggest that domestic tourism development not only proves a good policy to stimulate economic development, but it also helps reduce vulnerability.

Second, the results show that the impact of domestic tourism in reducing EVI is consistent in LMCs, but this is not the case for UHCs (with non-significant effects of increasing EVI detected). This result underlines the difference in the impact of domestic tourism on economic vulnerability across income levels; whereas, domestic tourism spending is found to have a significant impact in increasing the shock index in UHCs, reflecting the vulnerable nature of tourism development in these countries. That is, it is likely to prompt

policymakers in these two groups of countries to approach tourism development with different strategies, and, especially in UHCs, to steer clear of higher risks of vulnerability.

Third, the analysis of the three sub-periods demonstrates that the impact of domestic tourism spending in reducing EVI is consistent and significant in the periods 2002–2007 and 2008–2012, while this impact is statistically non-significant solely in the period 2013–2017, implying that the positive contribution of domestic tourism to the overall economy by reducing vulnerability is weaker, and may not have been effective in recent years. This effect is because the tourism industry has to operate in the context of globalisation and changing markets. Also, external shocks, such as contagious disease threats to global health (SARS, H1N, Covid-19, etc.), can significantly change the demand for travel and tourism products. The tourism industry therefore has to face this challenge, thus failing to reduce its vulnerability impact on economic activities.

Fourth, the study provides evidence that a U-shape relationship exists between domestic tourism spending and EVI, implying that mass tourism could hamper economic resilience. Therefore, it is necessary to increase regulations to put the brakes on mass tourism, to ensure economic resilience. The results show that while domestic tourism spending significantly contributes to the reduction of economic vulnerability, international tourism has the opposite effect. These findings call for a more suitable policy formulation to avoid adverse effects from tourism development that may have an impact for many years to come.

Last but not least, besides the impact of domestic tourism spending on EVI, the literature has paid much attention to the impact of uncertainty or vulnerability on tourism development (Nguyen et al., 2020). This suggests that there may be a potential effect of EVI on domestic tourism spending. In this study, we have estimated the effects of domestic tourism spending on EVI by controlling the feedback effect of EVI through dealing with the endogeneity problem from applying GMM and SELPDM techniques. However, the impact of EVI on tourism may be an interesting topic of future research direction in tourism.

Declaration of competing interest

There is no conflict of interest.

Acknowledgement

The author is grateful for the insightful comments and helpful suggestions from the Associate Editor and four Reviewers. All remaining errors are the author's own.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.annals.2020.103063>.

References

- Alam, M. S., & Paramati, S. R. (2016). The impact of tourism on income inequality in developing economies: Does Kuznets curve hypothesis exist? *Annals of Tourism Research*, 61, 111–126. <https://doi.org/10.1016/j.annals.2016.09.008>
- Alam, M. S., & Paramati, S. R. (2017). The dynamic role of tourism investment on tourism development and CO2 emissions. *Annals of Tourism Research*, 66, 213–215. <https://doi.org/10.1016/j.annals.2017.07.013>
- Ali, F., & Cobanoglu, C. (2020). Global tourism industry may shrink by more than 50% due to the pandemic. Retrieved from <https://theconversation.com/global-tourism-industry-may-shrink-by-more-than-50-due-to-the-pandemic-134306>.
- Bailey, D., & Katz, J. N. (2011). Implementing panel corrected standard errors in R: The psc package. *Journal of Statistical Software*, 42(CS1), 1–11.
- Balaguer, J., & Cantavella-Jorda, M. (2002). Tourism as a long-run economic growth factor: The Spanish case. *Applied Economics*, 34(7), 877–884.
- Banerjee, O., Cicowicz, M., & Gachot, S. (2015). A quantitative framework for assessing public investment in tourism – An application to Haiti. *Tourism Management*, 51, 157–173. <https://doi.org/10.1016/j.tourman.2015.05.015>
- Bangwayo-Skeete, P. F., & Skeete, R. W. (2020). Modelling tourism resilience in small island states: A tale of two countries. *Tourism Geographies*, 1–22.
- Barrot Araya, L.-D., Calderón, C., & Servén, L. (2016). *Openness, specialization, and the external vulnerability of developing countries*. The World Bank.
- Blake, A., Arbache, J. S., Sinclair, M. T., & Teles, V. (2008). Tourism and poverty relief. *Annals of Tourism Research*, 35(1), 107–126.
- Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115–143.
- Briguglio, L. (1993). The economic vulnerabilities of small island developing states. In *Paper presented at the Study Commissioned by CARICOM for the Regional Technical Meeting of the Global Conference on the Sustainable Development of Small Island Developing States, Port of Spain, Trinidad and Tobago, July 1993*.
- Briguglio, L. (1995). Small island developing states and their economic vulnerabilities. *World Development*, 23(9), 1615–1632.
- Briguglio, L. (1997). Small island developing states and their economic vulnerabilities. In *Vol. 58. Scope-Scientific Committee on Problems of the Environment International Council of Scientific Unions* (pp. 210–215).
- Briguglio, L., Cordina, G., Farrugia, N., & Vella, S. (2009). Economic vulnerability and resilience: Concepts and measurements. *Oxford Development Studies*, 37(3), 229–247. <https://doi.org/10.1080/13600810903089893>
- Bussière, M., & Mulder, C. (2000). Political instability and economic vulnerability. *International Journal of Finance & Economics*, 5(4), 309–330. [https://doi.org/10.1002/1099-1158\(200010\)5:4<309::Aid-ijfe136>3.0.Co;2-i](https://doi.org/10.1002/1099-1158(200010)5:4<309::Aid-ijfe136>3.0.Co;2-i)
- Carrascal Incera, A., & Fernández, M. F. (2015). Tourism and income distribution: Evidence from a developed regional economy. *Tourism Management*, 48, 11–20. <https://doi.org/10.1016/j.tourman.2014.10.016>
- Cavallo, E. A., & Frankel, J. A. (2008). Does openness to trade make countries more vulnerable to sudden stops, or less? Using gravity to establish causality. *Journal of International Money and Finance*, 27(8), 1430–1452.
- Choi, C. (2016). Does economic growth really reduce disaster damages? Index decomposition analysis for the relationship between disaster damages, urbanization and economic growth and its implications. *International Journal of Urban Sciences*, 20(2), 188–205. <https://doi.org/10.1080/12265934.2016.1144520>
- Çiçek, D., Zencir, E., & Kozak, N. (2017). Women in Turkish tourism. *Journal of Hospitality and Tourism Management*, 31, 228–234. <https://doi.org/10.1016/j.jhtm.2017.03.006>

- Cordina, G. (2004). Economic vulnerability and economic growth: Some results from a neo-classical growth modelling approach. *Journal of Economic Development*, 29(2), 21–39.
- de Loyola Hummel, B. M., Cutter, S. L., & Emrich, C. T. (2016). Social vulnerability to natural hazards in Brazil. *International Journal of Disaster Risk Science*, 7(2), 111–122. <https://doi.org/10.1007/s13753-016-0090-9>
- Dogru, T., & Bulut, U. (2018). Is tourism an engine for economic recovery? Theory and empirical evidence. *Tourism Management*, 67, 425–434. <https://doi.org/10.1016/j.tourman.2017.06.014>
- Essers, D. (2013). Developing country vulnerability in light of the global financial crisis: Shock therapy? *Review of Development Finance*, 3(2), 61–83.
- Eugenio-Martin, J. L. (2003). Modelling determinants of tourism demand as a five-stage process: A discrete choice methodological approach. *Tourism and Hospitality Research*, 4(4), 341–354. <https://doi.org/10.1177/146735840300400407>
- Feindouno, S., & Goujon, M. (2016). *The retrospective economic vulnerability index, 2015 update* (Retrieved from).
- Feldkircher, M. (2014). The determinants of vulnerability to the global financial crisis 2008 to 2009: Credit growth and other sources of risk. *Journal of International Money and Finance*, 43, 19–49. <https://doi.org/10.1016/j.jimonfin.2013.12.003>
- Ferrarini, B., & Hummels, D. (2014). Asia and global production networks: Implications for trade, incomes and economic vulnerability. In *Asia and global production networks*. Edward Elgar Publishing.
- Garau-Vadell, J. B., Gutierrez-Taño, D., & Diaz-Armas, R. (2018). Economic crisis and residents' perception of the impacts of tourism in mass tourism destinations. *Journal of Destination Marketing & Management*, 7, 68–75. <https://doi.org/10.1016/j.jdmm.2016.08.008>
- Garsous, G., Corderi, D., Velasco, M., & Colombo, A. (2017). Tax incentives and job creation in the tourism sector of Brazil's SUDENE area. *World Development*, 96, 87–101. <https://doi.org/10.1016/j.worlddev.2017.02.034>
- Gnangnon Sena, K. (2016). Trade openness and structural vulnerability in developing countries. *Journal of Economic Studies*, 43(1), 70–89. <https://doi.org/10.1108/JES-01-2015-0013>
- Gooroochurn, N., & Milner, C. (2005). Assessing indirect tax reform in a tourism-dependent developing country. *World Development*, 33(7), 1183–1200. <https://doi.org/10.1016/j.worlddev.2005.04.005>
- Gössling, S., Peeters, P., Hall, C. M., Ceron, J.-P., Dubois, G., Lehmann, L. V., & Scott, D. (2012). Tourism and water use: Supply, demand, and security. An international review. *Tourism Management*, 33(1), 1–15. <https://doi.org/10.1016/j.tourman.2011.03.015>
- Greiner, A., Feichtinger, G., Haunschmid, J. L., Kort, P. M., & Hartl, R. F. (2001). Optimal periodic development of a pollution generating tourism industry. *European Journal of Operational Research*, 134(3), 582–591. [https://doi.org/10.1016/S0377-2217\(00\)00279-4](https://doi.org/10.1016/S0377-2217(00)00279-4)
- Gu, X., Li, G., Chang, X., & Guo, H. (2017). Casino tourism, economic inequality, and housing bubbles. *Tourism Management*, 62, 253–263. <https://doi.org/10.1016/j.tourman.2017.04.006>
- Inchausti-Sintes, F. (2015). Tourism: Economic growth, employment and Dutch Disease. *Annals of Tourism Research*, 54, 172–189. <https://doi.org/10.1016/j.annals.2015.07.007>
- Jucan, C. N., & Jucan, M. S. (2013). Travel and tourism as a driver of economic recovery. *Procedia Economics and Finance*, 6, 81–88. [https://doi.org/10.1016/S2212-5671\(13\)00117-2](https://doi.org/10.1016/S2212-5671(13)00117-2)
- Katircioglu, S. T. (2014). International tourism, energy consumption, and environmental pollution: The case of Turkey. *Renewable and Sustainable Energy Reviews*, 36, 180–187. <https://doi.org/10.1016/j.rser.2014.04.058>
- Kerschner, C., Prell, C., Feng, K., & Hubacek, K. (2013). Economic vulnerability to Peak Oil. *Global Environmental Change*, 23(6), 1424–1433. <https://doi.org/10.1016/j.gloenvcha.2013.08.015>
- Kriptfganz, S., & Schwarz, C. (2019). Estimation of linear dynamic panel data models with time-invariant regressors. *Journal of Applied Econometrics*, 34(4), 526–546.
- Le, T. D. N. (2019). Climate change adaptation in coastal cities of developing countries: Characterizing types of vulnerability and adaptation options. *Mitigation and Adaptation Strategies for Global Change*. <https://doi.org/10.1007/s11027-019-09888-z>
- Lee, C.-K., & Kang, S. (1998). Measuring earnings inequality and median earnings in the tourism industry. *Tourism Management*, 19(4), 341–348. [https://doi.org/10.1016/S0261-5177\(98\)00033-8](https://doi.org/10.1016/S0261-5177(98)00033-8)
- Lee, D., & Lim, H. (2019). Industrial structure and the probability of crisis: Stability is not resilience. *International Journal of Finance & Economics*, 24(1), 212–226. <https://doi.org/10.1002/ijfe.1658>
- Lee, J. W., & Brahmashrene, T. (2013). Investigating the influence of tourism on economic growth and carbon emissions: Evidence from panel analysis of the European Union. *Tourism Management*, 38, 69–76. <https://doi.org/10.1016/j.tourman.2013.02.016>
- Li, H., Chen, J. L., Li, G., & Goh, C. (2016). Tourism and regional income inequality: Evidence from China. *Annals of Tourism Research*, 58, 81–99. <https://doi.org/10.1016/j.annals.2016.02.001>
- Liao, H., & Cao, H.-S. (2013). How does carbon dioxide emission change with the economic development? Statistical experiences from 132 countries. *Global Environmental Change*, 23(5), 1073–1082.
- Liu, X., & Bae, J. (2018). Urbanization and industrialization impact of CO2 emissions in China. *Journal of Cleaner Production*, 172, 178–186. <https://doi.org/10.1016/j.jclepro.2017.10.156>
- Lv, Z. (2019). Deepening or lessening? The effects of tourism on regional inequality. *Tourism Management*, 72, 23–26. <https://doi.org/10.1016/j.tourman.2018.11.009>
- Ma, B., Cai, Z., Zheng, J., & Wen, Y. (2019). Conservation, ecotourism, poverty, and income inequality – A case study of nature reserves in Qinling, China. *World Development*, 115, 236–244. <https://doi.org/10.1016/j.worlddev.2018.11.017>
- Malik, A., & Temple, J. R. W. (2009). The geography of output volatility. *Journal of Development Economics*, 90(2), 163–178. <https://doi.org/10.1016/j.jdeveco.2008.10.003>
- Martins, L. F., Gan, Y., & Ferreira-Lopes, A. (2017). An empirical analysis of the influence of macroeconomic determinants on world tourism demand. *Tourism Management*, 61, 248–260.
- Mathonnat, C., & Minea, A. (2018). Forms of democracy and economic growth volatility. *Economic Modelling*. <https://doi.org/10.1016/j.econmod.2018.07.013>
- Meng, W., Xu, L., Hu, B., Zhou, J., & Wang, Z. (2016). Quantifying direct and indirect carbon dioxide emissions of the Chinese tourism industry. *Journal of Cleaner Production*, 126, 586–594. <https://doi.org/10.1016/j.jclepro.2016.03.067>
- Morales, J. A. (1994). The vulnerability of inflation stabilization to external shocks: A case study of Bolivia. In E. L. Bacha (Ed.), *Economics in a changing world: Volume 4: Development, trade and the environment* (pp. 171–194). London: Palgrave Macmillan UK.
- Nassani, A. A., Aldakhil, A. M., Abro, M. M. Q., Islam, T., & Zaman, K. (2018). The impact of tourism and finance on women empowerment. *Journal of Policy Modeling*. <https://doi.org/10.1016/j.jpmod.2018.12.001>
- Naudé, W., Santos-Paulino, A. U., & McGillivray, M. (2009). Measuring vulnerability: An overview and introduction. *Oxford Development Studies*, 37(3), 183–191.
- Nguyen, C. P., Schinckus, C., & Su, T. D. (2020). Economic policy uncertainty and demand for international tourism: An empirical study. *Tourism Economics*. <https://doi.org/10.1177/1354816619900584> (1354816619900584).
- Nguyen, K.-A., & Liou, Y.-A. (2019). Global mapping of eco-environmental vulnerability from human and nature disturbances. *Science of the Total Environment*, 664, 995–1004. <https://doi.org/10.1016/j.scitotenv.2019.01.407>
- Noy, I., & Yonson, R. (2018). Economic Vulnerability and Resilience to Natural Hazards: A survey of concepts and measurements. *Sustainability*, 10(8), 2850.
- OECD. (2010). *OECD tourism trends and policies 2010*.
- OECD. (2020). *OECD tourism trends and policies 2020*.
- Perera, D. H., & Lee, G. H. Y. (2013). Have economic growth and institutional quality contributed to poverty and inequality reduction in Asia? *Journal of Asian Economics*, 27, 71–86. <https://doi.org/10.1016/j.asieco.2013.06.002>
- Robaina-Alves, M., Moutinho, V., & Costa, R. (2016). Change in energy-related CO2 (carbon dioxide) emissions in Portuguese tourism: A decomposition analysis from 2000 to 2008. *Journal of Cleaner Production*, 111, 520–528. <https://doi.org/10.1016/j.jclepro.2015.03.023>
- Saenz-de-Miera, O., & Rosselló, J. (2014). Modeling tourism impacts on air pollution: The case study of PM10 in Mallorca. *Tourism Management*, 40, 273–281. <https://doi.org/10.1016/j.tourman.2013.06.012>

- Seraphin, H., Sheeran, P., & Pilato, M. (2018). Over-tourism and the fall of Venice as a destination. *Journal of Destination Marketing & Management*, 9, 374–376. <https://doi.org/10.1016/j.jdmm.2018.01.011>
- Seth, A., & Ragab, A. (2012). *Macroeconomic vulnerability in developing countries: Approaches and issues* (Retrieved from).
- Sun, Y.-Y. (2014). A framework to account for the tourism carbon footprint at island destinations. *Tourism Management*, 45, 16–27. <https://doi.org/10.1016/j.tourman.2014.03.015>
- Tang, Z., Shang, J., Shi, C., Liu, Z., & Bi, K. (2014). Decoupling indicators of CO2 emissions from the tourism industry in China: 1990–2012. *Ecological Indicators*, 46, 390–397. <https://doi.org/10.1016/j.ecolind.2014.06.041>
- Vanegas, M. (2014). The triangle of poverty, economic growth, and inequality in Central America: Does tourism matter? *Worldwide Hospitality and Tourism Themes*, 6 (3), 277–292.
- Wang, J., Huang, X., Gong, Z., & Cao, K. (2020). Dynamic assessment of tourism carrying capacity and its impacts on tourism economic growth in urban tourism destinations in China. *Journal of Destination Marketing & Management*, 15, Article 100383. <https://doi.org/10.1016/j.jdmm.2019.100383>
- Windmeijer, F. (2005). A finite sample correction for the variance of linear efficient two-step GMM estimators. *Journal of Econometrics*, 126(1), 25–51. <https://doi.org/10.1016/j.jeconom.2004.02.005>
- WTTC. (2019). Travel & tourism economic impact 2018. Retrieved from London SE1 OHR, United Kingdom <https://wttc.org/Research/Economic-Impact>.
- WTTC. (2020a). Economic impact reports. Retrieved from <https://wttc.org/Research/Economic-Impact>.
- WTTC. (2020b). *Impact of the Ebola epidemic on travel & tourism* (Retrieved from London SE1 OHR, United Kingdom).
- Zhang, L., & Gao, J. (2016). Exploring the effects of international tourism on China's economic growth, energy consumption and environmental pollution: Evidence from a regional panel analysis. *Renewable and Sustainable Energy Reviews*, 53, 225–234. <https://doi.org/10.1016/j.rser.2015.08.040>