

Terrorism and Tourism: Evidences from a Panel OLS Estimation

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Abstract: This paper studies the impact of terrorism on the number of tourist arrivals through an unbalance data set using OLS estimation with fixed effects. The study is carried out on 167 countries for the period 1995 to 2014. The results suggest that the number of terrorist attacks have a significant negative effect on tourism. We also quantify the spillover effect from the regions directly affected by a terrorist attack to other non-affected regions located within and outside of the affected region. Finally, our findings also suggest that, in countries where terrorist attacks are observed, there exists a particular level of military expenditure as a proportion of GDP above which tourism statistics tend to increase.

JEL classification codes: C23, F14, H56, Z3.

Keywords: terrorism, tourism, military expenditure, panel estimation, OLS.

1. INTRODUCTION

How do terrorist events affect tourism demand? The heightened awareness of the human costs associated with terrorist events, as well as the significant redirection of economic resources have refocused efforts towards a better understanding of the economic consequences of terrorism (Blomberg et al., 2004). It is particularly important to know what the economic consequences of a terrorist attack may be, since these could affect key sectors for the affected economies. It is therefore an area of enormous interest both from an academic point of view and for geopolitical decision-making at the international level.

It was not until the terrorist attacks of September 11 in New York that the literature on the effects of terrorism on the economy exploded noteworthy.¹ From that moment, many researchers have been interested in applying applied econometric methods to analyze whether terrorism has had significant consequences on macroeconomic aggregates, such as growth, income and investment (Gaibulloev and Sandler, 2019). Both analytical and descriptive analyses discuss the economic consequences of terrorism, the effectiveness of counter terrorism measures and trends in terrorist attacks, among other issues (Sandler, 2014). Moreover, globalization has also increased fear of the consequences of terrorism on tourism. Nowadays, terrorism is one of the main concerns for

multilateral organizations and governments around the World (Essaddam and Karagianis, 2014).²

Additionally, terrorist attacks in Belgium, France, the U.K., the U.S. and some Middle East countries, such as Syria and Turkey since 2016, together with the progressive radicalization of countries as important on the international scene as Saudi Arabia, have increased concerns about terrorist incidents and its effects on the main sectors of the economy such as oil or tourism.

On the other hand, the importance of the tourism sector in the world economy is enormous. According to the United Nations World Tourism Organization report (2019), tourism represents approximately 10% of the global GDP. Moreover, it generates one in eleven jobs and US\$1.5 trillion in exports (7% of the world's total exports).³ Furthermore, the number of international tourists has increased from 25 million in 1950 to 1,235 million since 2016 and it is expected to continue increasing to 1.8 in 2030 (UNWTO, 2016). Furthermore, tourism is, in many cases, the main source of foreign exchange earnings and foreign direct investment (Drakos and Kutan, 2003) and it is also a relevant sector that provides important tax revenues and alleviates poverty, especially in developing countries (Yap and Saha, 2013).

It seems quite reasonable to think that terrorism can negatively affect tourism, since attacks are nothing but a threat to the integrity of people wherever they occur. Terrorist attacks are themselves violent acts and therefore are expected to have a negative impact on the number of visitors. This is explained because, in the face of a terrorist attack, visitors

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¹ It is estimated that the short-term economic cost of the terrorist attacks of September 11 in New York cost approximately \$21.4 billion dollars (Richman et al., 2011).

² According to Essaddam and Karagianis (2014), thirty six percent of multinational senior executives indicate terrorism as the largest threat they face.

³ Tourism constitutes also a significant share of exports, such as Israel (7%), Ukraine (7%), France (8%), the Philippines (8%), the U.S. (9%), Thailand (16%), Egypt (16%), Turkey (17%) and Kenya (18%) (Santana-Gallego, Rossello-Nadal, and Fourie 2016).

perceive the place as unsafe and try to minimize the possible damage or risks to which they may be exposed during their trip. This effect increases when tourists are used as a political and media weapon, the attacks are repeated in short periods of time and the countries of origin of the tourists begin to discourage traveling to certain countries or regions. Added to all these problems are the possible material damage caused by terrorist attacks on local tourist infrastructures (Llorca-Vivero, 2008) and the damage caused to national tourist monuments (Yap and Saha, 2013).

For all these reasons, a considerable reduction in the number of tourists is expected when a terrorist attack occurs in a certain destination. It is important to mention that countries which are politically stable but face a small number of terrorist events (USA or Spain) could suffer less from the impacts of terrorism on their tourism industry than those countries that are politically unstable and prone to terrorist activities⁴ (Saha and Yap, 2014). Political events such as coups and internal political problems have far more severe impacts on tourism activity than one-off terrorist attacks (Fletcher and Morakabati, 2008).

The main objective of this paper is to develop a tourism demand model that can capture some of the impacts of terrorism on tourism through a panel OLS analysis. We apply this methodology instead of time series methods as it enables the combination of a temporal dimension with a transversal dimension.

In the same vein, we also examine whether military expenditure as a percentage of GDP helps improve tourism statistics when terrorist attacks are observed. This is why, some authors affirm that when military coups occur, we observe severe negative effects on tourism development as government resources are spent on military and not on developing infrastructure (Teye, 1988). Our hypothesis suggests that military expenditure negatively affects tourism. While Saha and Yap (2014) use the interaction effect to analyze the relationship between political stability and terrorism, we are interested in observing, with the same method, what the effectiveness of increasing military expenditure over GDP is in countries where terrorist events have been observed. As we mentioned, the objective is to determine if, in high-risk countries, there exists a particular level of military expenditure over GDP above which tourism figures start to improve. In other words, how much of the total country income would be necessary to spend on the military if countries wished to improve their tourism rates.

Finally, we present the spillover effects of terrorist attacks on countries located in the same geographical region and on those in different regions. Our intention is to show how neighboring regions benefit from or are harmed by a terrorist event. Hence, we expect that the distance from the attack is relevant in order to determine the transfer ratio (suggested in a study for Israel, Turkey and Greece by Drakos and Kutan, 2003). This is very relevant since “it has been observed that destinations that develop an unsafe reputation can be substituted by alternative destinations or cities that are perceived as safer for tourists” (Mc Baker, 2014). To the best of our

knowledge, there are no previous similar studies that quantify the tourist spillover effects from countries and regions on a global scale as most of them address the issue for a specific country or region.

To explore the effects of terrorism on tourism, we use yearly country-level data on terror incidents and international tourist arrivals for 167 countries for the period 1995 to 2014 and perform a panel data analysis including fixed effects.

2. LITERATURE REVIEW

According to existing quantitative literature, where drops in tourism have occurred these seem to be linked to terrorism. Literature about terrorism and tourism demand follows, in general, three lines: motives for which terrorists target the tourism sector, solutions to minimize the risk of decreasing tourists and the consequences of terrorism on tourism demand (Pizam and Smith, 2000; Gaibullov and Sandler, 2011; Mc Baker, 2014).

Enders and Sandler (1991) built an autoregressive integrated moving average (ARIMA) technique with a transfer function to construct a forecasting model for the share of tourism. Their results suggest that terrorist incidents have had an adverse effect on tourism revenues in Europe and that tourists have moved from some countries to others to minimize the risk of experiencing terrorist incidents. Enders et al. (1992) provide empirical evidence on the link between terrorism and the tourism sector for a sample of European countries and through a vector autoregressive analysis (VAR). Using an ARIMA model with a transfer function based on the time series of terrorist attacks in Austria, Greece and Italy, they find that a terrorist attack in Greece costs 23.4% of its annual tourism income for 1998 (Enders and Sandler, 1992). In their study on the effect of terrorist events on tourist demand in Israel, Pizam et al. (2002) confirmed the hypothesis that the frequency of terrorist acts had caused a greater decline in international tourist arrivals than the severity of the events themselves. These acts. Drakos and Kutan (2003) also developed an empirical research regarding the effects of terrorism on tourism arrivals to Greece, Israel and Turkey. Their results show that terrorism causes a significant negative effect on tourism and that the intensity, in terms of causalities and geographical situation, are also relevant for tourism rates. In addition, there is also a substitution effect between Greece and Turkey when one of them suffers a terrorist attack.

Neumayer (2004) conducts an empirical investigation regarding political instability impacts on tourism using fixed effects and a dynamic generalized method of moments panel data models. He was the first to present a comprehensive general quantitative estimation of the impact of political violence on tourism for the period 1977 to 2000. His results suggest that human rights violations, conflict, and other politically motivated violent events negatively affect tourist arrivals. Llorca-Vivero (2008), using bilateral tourism data to estimate a cross-sectional gravity model, studies the effect of terror attacks on tourist arrivals by analyzing tourism from the G-7 countries to 134 destinations. The research evaluates the differentiation between routine tourist flows and international arrivals following terrorism, pointing to a larger deviation in developing countries. He finds that terrorism seriously damages the tourism industry, having a particularly severe

⁴ For instance, Pakistan or Afghanistan.

effect in developing countries. More recently, Robbins (2012) uses a cross-sectional gravity equation to measure the impact of terrorism on international tourist flows for eight European destination countries for the period 1991 to 2009. He shows that both the amount of terrorist attacks and the number of fatalities due to terrorism negatively affect tourism flows to European destination countries.

Yap and Saha (2013) employ panel data methodology from 139 countries for the period 1999-2009 to evaluate the effects of political stability, terrorism and corruption on tourism development, particularly UNESCO-listed heritage destinations. Their results suggest that in the presence of heritage, terrorism has a negative effect on tourism demand even though its effect is lower than that of political instability. In a similar study, Saha and Yap (2014) aim to analyze the effects of the interaction between political instability and terrorism on tourism developments using panel data from 139 countries for the period 1999-2009. Their findings suggest that the effect of political instability on tourism is higher than the effect of one-off terrorist attacks. They even claim that terrorist attacks can increase tourism in low-to moderate political risk countries. Santana-Gallego et al. (2016) examine the effect of terrorism, crime and corruption on tourism arrivals for 171 countries (1995-2013) through a panel data analysis employing three-dimensional analysis to total tourist arrivals but disaggregated by destination and country of origin (through a gravity model for bilateral tourism flows). Their findings illustrate that terrorism and crime have a negative effect on tourism demand, this effect being, in general, greater for leisure tourism than for business tourism.⁵ They also affirm that the level of development of the country (HDI) and its attractiveness (UNESCO) are determinant factors for terrorism effects on international arrivals. By using a panel/zero-inflated negative binomial regression model, Goldman and Neubauer-Shani (2016) study the incidence of terrorism on transnational terrorism. They conclude that there is an inverse U-relationship between the number of arrivals and number of attacks perpetrated by foreigners, and also a robust significant relationship between number of arrivals to a country and terror attacks in which both the attacker and the victim are foreigners.

Liu and Pratt (2017) examine tourism's vulnerability and resilience to terrorism for 95 countries from 1995 to 2012 through an autoregressive distributed lag model (ARDL). Their conclusions suggest that in general, international tourism is resilient to terrorism. Moreover, there is no long-run effect of terrorism on international tourism and the short-run effect of terrorism on international tourism is quite small. Samitas et al. (2018) examine the impact of terrorism on tourism demand in Greece using monthly data from 1977 to 2012, testing if this relationship is bidirectional and whether it exhibits long run persistence through performing cointegration and long-run causality tests, correcting the data for cyclical seasonality and applying PCA to construct a terrorism measure. Their results conclude that terrorism has a significant negative impact on tourist arrivals to Greece.

⁵ They affirm that leisure tourism represents about 70% of the total number of arrivals. This is also the most representative and the most sensitive to terrorist events.

The paper proceeds as follows. In Section 3 we describe the dataset and present the methodology employed in the paper. Section 4 contains the main empirical results. Finally, Section 5 provides our interpretation and final conclusions.

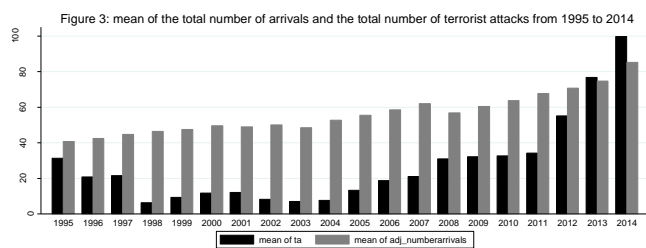
3. DATA AND METHODOLOGY

The annual data examined in this chapter correspond to 167 countries for the period 1995 to 2014. It is important to mention that, there is not complete information on each variable though the years. As a result, we consider a sample up to 2,076 observations.⁶ The rapid growth of the jihadist attacks and the spread of the Middle East war conflicts during the last 15 years, justifies the election of the selected period. Similar temporal space has been recently chosen by authors such as Santana-Gallego et al. (2016) or Liu and Pratt (2017).

International arrivals data was obtained from the World Bank Database 2015 (World Bank, 2015), that collects information from 1995 to 2014 of inbound tourists (overnight visitors) who travel to a country other than that in which they have their usual residence, but outside their usual environment, for a period not exceeding 12 months and whose main purpose in visiting is other than an activity remunerated from within the country visited.

The total number of terrorist events by year was obtained from Global Terrorism Database (National Consortium for the Study of Terrorism and Responses to Terrorism (START) 2015), which records both domestic and transnational terrorism.⁷ This terrorism database collects broad information about terrorist attacks from 1970 to 2015.⁸ It has been used in recent similar papers such as Santana-Gallego et al. (2016), Pizam and Smith (2000) or Samitas et al. (2008).

The increasing trend can be clearly observed in the data recorded during the period under study, both for the number of terrorist attacks and for the arrival of international tourists (Fig. 3).



⁶ The UN Organization recognizes 193 sovereign states. We do not have enough information of Nauru Republic, Montenegro, Libya, Liberia, Iceland, Guinea, Gabon, Eritrea, Equatorial Guinea, Cote d'Ivoire, Myanmar, Qatar, Serbia, Sta. Lucia, Sudan, Timor-Leste, Togo, Trinidad and Tobago, Turkmenistan, Uzbekistan, Vietnam, Malawi, San Marino, Somalia, South Sudan or Syria. As a result, we obtain a sample of 167 countries.

⁷ Type of recorded events: assassination, hijacking, kidnapping, barricade incident, bombing/explosion, armed assault, unarmed assault, facility/infrastructure attack).

⁸ Other similar and popular datasets are the RAND (2012) terrorist event database and the International Terrorism: Attributes of Terrorist Events (ITERATE).

The rest of the variables, such as military expenditure over GDP9, GDP at purchaser prices (constant 2010 US\$), population, voice and accountability index, were obtained from the World Development or Governance Indicators (World Bank, 2015) and from the UNESCO World Heritage Centre. Table 1 shows the main descriptive statistics of each variable.

Table 1.- Descriptive Statistics.

Variable	Obs.	Mean	Std. Dev.	Min	Max
NA (total)	2.620	5609164	1.13e+07	3000	8.38e+07
TA (total)	3007	27.58131	149.489	0	3925
ME (% over GDP)	3007	2.331156	1.780913	0	17.33469
GDP (US\$)	2906	3.98e+11	1.36e+12	1.18e+08	1.62e+13
WHS (index)	3007	.9215165	.2689757	0	1
N (total)	3006	5.91e+07	1.49e+08	201678	1.36e+09
VA (index)	2282	.0043362	.9427864	-	1.826381
				2.238878	

Note: NA are the international tourism arrivals per capita by country, TA is the number of terrorist attacks, ME is the percentage of military expenditure over GDP, GDP is the GDP at purchaser prices (constant 2010 US\$), WHS is the current membership to the UNESCO World Heritage Sites list, N is the total population.

In this article, we examine the impact of terrorist events on the number of international arrivals using an unbalanced fixed effects panel data analysis for 167 countries for the period 1995 to 2014.10 The reason why we include panel data analysis is that it provides more information, more variability, less collinearity, more degrees of freedom and greater efficiency (Baltagi, 2008). Furthermore, it enables the combination of a temporal dimension with a transversal dimension. Panel methodology can be found in similar recent studies such as Santana-Gallego et al. (2016) or Saha and Yap (2014). We define our panel model with fixed effects as follows:

$$\begin{aligned} \ln NA_{i,t} = & \beta_1 TA_{i,t} + \sum_{h=1}^4 \gamma R_h + L_1 \ln TAIN_{i,t} + L_2 \ln TAOUT_{i,t} \\ & + \beta_2 ME_{i,t} + \beta_3 TA_{i,t} \times ME_{i,t} + \beta_4 GDP_{i,t} + \beta_5 WHS_i \\ & + \beta_6 \ln N_{i,t} + \beta_7 VA_{i,t} + \mu_i + \Omega_t \end{aligned}$$

where $NA_{i,t}$ is the number of international tourism arrivals in country “i” and year “t”, \ln is equal to natural logarithm, $TA_{i,t}$ is the number of terrorist attacks per year and country, R_i is a dummy for each of the four regions we define (Africa

and Middle East, Asia and Pacific, Americas, Europe), $TAIN_{i,t}$ is the number of terrorist attacks that occurs in a given region, $TAOUT_{i,t}$ is the number of terrorist attacks that occurs outside of a given region, $ME_{i,t}$ is equal to the percentage of military expenditure over GDP per year and country, $GDP_{i,t}$ is the GDP at purchaser prices (constant 2010 US\$), WHS_i is a dummy which captures whether the region has a site currently belonging to the UNESCO World Heritage Sites, $N_{i,t}$ is the total population per year and country, $VA_{i,t}$ is the voice and accountability index, μ_i is a fixed effect country, Ω_t is a fixed effect year.

The use of each variable used in the model is justified below, as well as the precedents found in the specialized literature in this regard. We will also carry out a Hausman Test in order to verify the convenience of using fixed effects and thus avoid doubts about the multicollinearity of the model.

The dependent variable used is the natural logarithm of the number of international arrivals per year and country ($\ln NA_{i,t}$), similar to the methodology used by authors, such as Neumayer (2004), Yap and Saha (2013) or Santana-Gallego et al. (2016).11 Since the dependent variable is expressed as a logarithm, the coefficient can be interpreted as elasticity. This variable has the advantage of being measured with great precision for the simple reason that it is easier to count tourism numbers than to estimate tourism revenues of tourists in the destination country, as is done by some authors in the literature.12 Our independent variable is the total number of terrorist events per year and country ($TA_{i,t}$) divided by one hundred. Empirical researchers such as Feridun (2011) and Neumayer (2004) used the number of terrorist incidents as a proxy to measure the effects of terrorism on tourism demand. Some authors affirm that the more severe and the more frequent the TA is the greater the impact on tourism demand is due to the higher perceived risk (Pizam, 1999). In some cases, authors use the number of victims as a proxy of the intensity of the attack (Drakos and Kutun, 2003; Robbins, 2012; Aslam and Kang, 2013). After consideration, we have not included the number of victims registered per year as a measure of intensity of the attack because of the potential collinearity between events and causalities so that analyzing

11 “International inbound tourists (overnight visitors) are the number of tourists who travel to a country other than that in which they have their usual residence, but outside their usual environment, for a period not exceeding 12 months and whose main purpose in visiting is other than an activity remunerated from within the country visited. When data on number of tourists are not available, the number of visitors, which includes tourists, same-day visitors, cruise passengers, and crew members, is shown instead. Sources and collection methods for arrivals differ across countries. In some cases, data are from border statistics (police, immigration, and the like) and supplemented by border surveys. In other cases, data are from tourism accommodation establishments. For some countries number of arrivals is limited to arrivals by air and for others to arrivals staying in hotels. Some countries include arrivals of nationals residing abroad while others do not. Caution should thus be used in comparing arrivals across countries. The data on inbound tourists refer to the number of arrivals, not to the number of people traveling. Thus a person who makes several trips to a country during a given period is counted each time as a new arrival.” (World Bank Database, 2015).

12 Santana-Gallego et al. (2016) also uses tourist arrivals from UNWTO (2015), but they differentiate between leisure and business trips. They also control for population through expressing this variable per 10,000 inhabitants. Saha and Yap (2013) extract the data from Euromonitor International.

9 It includes all current and capital expenditures on the armed forces, including peacekeeping forces; defense ministries and other government agencies engaged in defense projects; paramilitary forces, if these are judged to be trained and equipped for military operations; and military space activities.

10 We apply annual data similar to other authors such as Blomberg et al. (2004).

them together could be problematic. Moreover, the sum of causalities do not seem to be a representative intensity measure at a year scale, as most of the causalities can be focus in a particular event and not spread through the annual terrorist events of each country. Nevertheless, the tested analysis considering this variable does not change our main signs and coefficients, with this variable remaining negative and significant.

It is important to mention that GTD (Global Terrorism Database) excludes attacks on civilians by government forces and fatalities during insurgencies or inter-group conflicts, and so it excludes most of the ways that civilians get killed in most parts of the global south.

With the aim of controlling by region of origin, we define dummy variables for each of our four defined regions (Ri). This is done in a similar way by Sandler and Enders (2008). Pizam and Smith (2000) and Drakos and Kutan (2003) also advocate considering differences between regions or countries when talking about terrorism effects on tourism.¹³

Terrorism, one form of political violence, poses a clear risk and as such represents one of the drawbacks of a potential destination and reduces tourist demand for that location (Sönmez and Graefe, 1998; Martin and Gu, 1992). The effects of terrorism incidents on tourism demand vary across countries (Lorca-Vivero 2008). Neighbors of terror-stricken countries could also suffer from terrorism (Eric Neumayer and Plümper, 2009). Nevertheless, “it has been observed that destinations that develop an unsafe reputation can be substituted by alternative destinations or cities that are perceived as being safer for tourists” (Mc Baker 2014). Tourists aim to minimize the risk of terrorist attack by substituting more risky destinations for safe ones (Araña and León, 2008). For all these reasons, and with the aim of observing the spillover effects between regions, we define two variables. First, the total number of terrorist events (divided by one hundred) that take place in the region each country belongs to, per year and country (TAIN_{i,t}). Second, the total sum of terrorist events (divided by one hundred) that take place out of the region each country belongs to, per year and country (TAOUT_{i,t}). The objective is to observe the behavior of the substitution flow effects between regions and countries. That is to say, how regions benefit or are harmed when a terrorist attack takes place outside or within a particular region.

We want to study whether the interaction of international arrivals is influenced by the military expenditure in countries where we observe terrorist attacks. To do so, we interact the number of terrorist attacks (TA_{i,t}) and the military expenditure (ME_{i,t}) as a percentage of GDP¹⁴. The objective is to study what occurs with the number of international tourist arrivals when the military expenditure varies in countries where we observe terrorist attacks. To the best of our knowledge, no authors have employed this methodology to

analyze the joint effect of these variables. In a similar way, Saha and Yap (2014) employ the interaction methodology in order to analyze the synergies between political instability and terrorism. The importance of the conclusions we obtain from this interaction term is relevant as we are quantifying the effectiveness of military expenditure on tourism demand in dangerous countries. Results could guide important geopolitical and budget decisions. The inflexion point from which the percentage of military expenditure over GDP improves tourism is shown in equation 2.

$$\frac{\partial \ln NA}{\partial TA} = \beta_1 + \beta_3 ME = 0 \quad (2)$$

In recent years, some papers have employed the panel dimension of the data by introducing a set of instruments for geography, policy or institutions (Blomberg et al., 2004). Taking into account the existing literature, we also include some relevant control variables in our model.

Pizam and Smith (2000) claim that the effects of terrorism on the economy are lower in countries with high levels of wealth, technological progress and freedom (ie: Israel). The majority of the authors include GDP measures in their models as a proxy for income or country development (Peng et al., 2014; Saha and Yap, 2014). Similarly, we include GDP at purchaser's prices (GDP_{i,t}).¹⁵

It is also common in the literature to include a dummy for the UNESCO World Heritage Sites (Ni,t) in order to control for the attractiveness of the country for tourists (Saha and Yap, 2014; Santana-Gallego et al., 2016).

It is also crucial that tourism demand models should include political risk variables in order to obtain more accurate forecasts of tourist business in the presence of political instability and terrorism (E. Neumayer 2004). Voice and accountability (VA_{i,t}) is used as a proxy for the quality of the institutions on each country, capturing to what extent citizens are able to participate in the election of their government as well as representing freedom of expression, association and media. In this way we endeavor to interpret the effect of human freedoms, right and democracy on international tourism decisions.

The regression includes interaction effects with controls for time and country fixed effects (“μ” fixed effect country, “Ωt” fixed effect year). The main objective of the country fixed effects is to control for the idiosyncratic characteristics of each country. Time effects try to capture the circumstantial events that may have affected the country in a given year in order to avoid omitting time-invariant variables. More particularly, our fixed effects mainly try to control for the positive relationship between terrorism and tourism even when our assumption in relation to the terrorist attacks is fulfilled. The positive trend of tourism, in spite of increasing number of global terrorist attacks, is due to a number of factors, among which are strong economic growth, the increase in disposable income and leisure time, easing of travel restrictions, successful tourist promotion, and the recognition of the importance of tourism by governments (Mc Baker 2014). That is precisely what our fixed effects try to capture.

¹³ Asia and Pacific region is randomly taken as the dummy reference region.

¹⁴ Military expenditures data from SIPRI are derived from the NATO definition, which includes all current and capital expenditures on the armed forces, including peacekeeping forces; defense ministries and other government agencies engaged in defense projects; paramilitary forces, if these are judged to be trained and equipped for military operations; and military space activities (World Bank Database, 2015).

¹⁵ PPP (constant 2010 US\$).

Similar panel fixed effects are employed by Saha and Yap (2014) or Santana-Gallego et al. (2016).

Hausman (1978) demonstrated that the difference between the fixed effect (FE) and random effect (RE) coefficients can be used to test the null hypothesis of non-correlation between the variables and μ_i , Ω_i .¹⁶ In our regression model, H0 is rejected. This means that the difference between the random and fixed effect coefficients is significant. Hence, we should use fixed effects (see results in Table 2).

Table 2.- Hausman Test.

Test: Ho: difference in coefficients not systematic	
chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B) =	49.81
Prob>chi2 =	0.0000
(V_b-V_B is not positive definite)	

Note: as observed in Table 2, Ho is rejected. This means that the difference between the random and fixed effects coefficients is significant. Hence, we should use fixed effects.

4. EMPIRICAL RESULTS

We construct an unbalanced panel data model to examine the impact of terrorism on tourism demand. The results from this section lend support to the majority of findings and assumptions we reported earlier. Table 3 presents the results of estimating equation (1) for the dependent variable $\ln NA_{i,t}$. As can be observed, we start from a very simplified model, successively including all the control variables considered with the objective of demonstrating the stability of the coefficients and signs that lead to a robust demand model.

As can be seen in Table 3 model seven, the coefficient of the variable $TA_{i,t}$ shows that when the number of terrorist events grow by 100 units, this entails a decrease in the number of arrivals of around 10.7%. Hence, the results suggest there is a negative effect of terrorism on the destination country. It is important to mention the robustness of our results, as the coefficients and signs remain negative and significant regardless of the model used and are in line with the related literature.

The results about regions R_i do not provide relevant insights. The present results only show that tourists tend to go more to Europe than to America or Africa and Middle East, when compared with Asia.

After demonstrating this, we move on to testing the spillover effects between regions. Positive coefficient of $TAIN_{i,t}$ shows that that if a terrorist attack takes place in a given region, the other group of countries located in the region increase their number of arrivals. This hypothesis suggests that even if there is a terrorist attack in a country from a particular region, we observe a positive substitution effect and the neighboring countries located in the same region will increase their number of arrivals by around 0.5% per one hun-

dred unit increase in the number of attacks. It can also be observed that this substitution effect is lower if the attack takes place in countries located outside the region $TAOUT_{i,t}$. In this case, non-affected regions increase their number of arrivals by around 0.1% per one hundred increases in the number of tourists. This statement is in the line with the results of Santana-Gallego et al. (2016) or Mc Baker (2014). They show that destinations that are considered as unsafe can be substituted by other, safer areas. Drakos and Kutan (2003) also corroborated the spillover effect between Greece and Turkey when one of them suffered a terrorist event.

Regarding the expected negative effect of military expenditure on tourism rates $ME_{i,t}$, our results show that there is a negative relationship between military expenditure over GDP and tourism statistics. This can be explained as government resources are being spent on the military and not on developing infrastructure that might enhance tourism (Teye, 1988). Through our study of the interaction between military expenditure and the number of terrorist attacks, we observe that there is a U-shape effect with a particular inflexion point where an increase in the military budget increases the number of arrivals per capita. Accordingly, we observe that in high risk countries (where terrorist attacks are observed) there appears to be a level of military expenditure as a percentage of GDP above which an increase positively affects tourism demand in terms of the number of arrivals. Specifically, this happens when the military budget expenditure over GDP is higher than 4.46%. This relationship is clearly observed in some Arabian countries such as Saudi Arabia (9.8% over GDP, World Bank, 2016) or Israel (5.7% over GDP, World Bank, 2016), among others.

We obtain this percentage by introducing coefficients β_1 and β_3 in equation (3)

$$\frac{\partial \ln NA}{\partial TA} = \beta_1 + \beta_3 ME = 0 ME = \frac{\beta_1}{\beta_3} = 4.46\% \quad (3)$$

As can be seen, there is a negative relationship between $GDP_{i,t}$ and the number of arrivals. After a deep reflection on the subject, we suggest that this could be explained by the increase in price of the local tourism prices. If the local GDP increases, this leads to an increase in the majority of the costs associated to tourism industry (wages, raw products, etc.). On the other hand, if the GDP increases, this usually leads to an appreciation of the local currency, which would make the destination more expensive and less attractive for travelers. Both reasons are expected to affect directly to the final local prices for tourism. Therefore, an increase in the price of tourist products in a country suggests that there will be a reduction in the number of international inbound to the local country. In any case, these interesting findings are not the main objective of the paper but definitely should be further explained in other research project.

The variables voice and accountability $VA_{i,t}$ and World Heritage Destination WHS_i are positively related with the number of arrivals. Hence, the more democratic and politically stable the country is, and the more attractive it is in terms of heritage and the greater the number of arrivals received by the country is. Finally, population is positively related to the number of arrivals, suggesting that more populated countries attract a larger number of international tourists.

¹⁶ This test is based on “Specification Tests in Econometrics” (Hausman , 1978).

Table 3. Regression Results.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	<i>ln NA</i>	<i>ln NA</i>	<i>ln NA</i>	<i>ln NA</i>	<i>ln NA</i>	<i>ln NA</i>	<i>ln NA</i>
TA	-0.195*	-0.356***	-1.024***	-0.986***	-0.986***	-1.001***	-1.074***
	(-1.775)	(-3.294)	(-3.582)	(-3.449)	(-3.449)	(-3.505)	(-3.634)
Europe		2.530***	0.698***	0.810***	0.810***	0.600***	0.575***
		(13.481)	(6.133)	(6.944)	(6.944)	(4.369)	(4.002)
Africa & Middle East		-1.266***	-1.822***	-1.854***	-1.854***	-1.477***	-1.540***
		(-4.475)	(-15.479)	(-15.726)	(-15.726)	(-8.420)	(-8.051)
Americas		2.107***	-2.938***	-2.927***	-2.927***	-2.722***	-2.852***
		(11.222)	(-25.986)	(-25.899)	(-25.899)	(-20.443)	(-20.663)
TAIN		0.142***	0.143***	0.144***	0.144***	0.137***	0.051***
		(22.577)	(22.592)	(22.732)	(22.732)	(19.937)	(5.341)
TAOUT		0.059***	0.057***	0.060***	0.060***	0.058***	-0.011
		(15.369)	(15.026)	(15.476)	(15.476)	(14.700)	(-1.360)
ME			-0.044***	-0.042***	-0.042***	-0.041***	-0.027**
			(-4.460)	(-4.222)	(-4.222)	(-4.114)	(-2.375)
TA x ME			0.211**	0.205**	0.205**	0.206**	0.241***
			(2.492)	(2.415)	(2.415)	(2.428)	(2.693)
GDP				-0.119***	-0.119***	-0.114***	-0.096***
				(-4.376)	(-4.376)	(-4.170)	(-3.266)
WHS					1.404***	0.813***	0.729***
					(12.109)	(3.458)	(2.915)
ln N						0.239***	0.207**
						(2.894)	(2.311)
VA							0.118***
							(3.172)
Constant	9.946***	10.966***	15.635***	15.638***	14.233***	10.569***	12.485***
	(39.246)	(74.367)	(169.648)	(169.380)	(97.804)	(8.294)	(8.868)
Observations	2,587	2,587	2,587	2,562	2,562	2,562	2,076
R-squared	0.969	0.971	0.971	0.971	0.971	0.971	0.977
FE (year and country)	YES	YES	YES	YES	YES	YES	YES
Adj. R-squared	0.967	0.969	0.969	0.969	0.969	0.969	0.975

Note: Table 3 shows the panel regression model for our sample. We start from a very simple model to finish with the most complex model. NA is number international tourism arrivals, ln is equal to logarithm, TA is the number of terrorist attacks per year and country, belonging to a region is specified by a dummy, TAIN is the number of terrorist attacks that occur in a given region, TAOUT is the number of terrorist attacks that occur outside that region, ME is equal to the percentage of military expenditure over GDP is the GDP at purchaser's prices (constant 2010m US\$), WHS captures the belonging to UNESCO World Heritage List, N is the total population, VA is the voice and accountability index. The significance levels are as follows: *** p<0.01, ** p<0.05, * p<0.1. Our database comes mainly from GTD database and World Bank Database. It covers a sample of 167 countries with annual observations for the period 1995 to 2014.

To sum up, our results suggest that terrorism has a negative impact on tourism demand. Moreover, present results corroborate the spillover effect from countries which are affected by attacks to the ones which are not affected both within and outside of the region; with this effect being larger for

countries located in the same region. Finally, by considering the coefficients of $TA_{i,t}$ and the interaction $ME_{i,t} \times TA_{i,t}$, we determine the percentage of military expenditure above which tourism rates begin to improve in countries where terrorist attacks are present.

5. CONCLUSIONS

Using a unique dataset that provides information on the annual incidence of international terrorism for 167 countries from 1995 to 2014, this article analyzes the consequences of terrorism on tourism demand through a panel analysis with fixed effects. The findings of the panel analysis suggest that the incidence of terrorism plays an important role when trying to determine the number of tourist international arrivals. The number of terrorist events is revealed to have a significant negative effect on tourist arrivals. Hence, our results suggest that the more riskier the country is, the lower the number of tourists is that is received by this country. The results also show that there is a spillover effect from the countries affected by a terrorist attack to other non-affected countries located within and outside the damaged region. This gain in tourists is larger for countries belonging to the affected region. In other words, our results suggest that tourists change their travel decision when terrorist events occur, moving from risky to safe areas both within and outside of the region. Related to the consequences of military expenditure on tourism arrivals, the results illustrate that the main relationship is negative. However, for countries where terrorist incidents are present, a particular level of military expenditure over GDP is observed from which an increase in the number arrivals can be seen. Hence, our results suggest that international tourist arrivals can significantly increase if military expenditure over GDP is high enough.

Definitively, our results show that the consequences of terrorist attacks on tourism are significant even when annual changes are being analyzed. Our findings show, not only the economic impact of terrorism on tourism, but also an important set of significant political, social and geographical assertions that have potential implications for policy makers who undertake counterterrorism measures.

As we can see, it is imperative for authorities to deal with terrorist incidents decisively, in order to protect the tourist sector. According to our results, countries that suffer attacks should have enough monetary, fiscal and defense tools at their disposal in order to avoid the negative effects of terrorism events on tourism. This recommendation is even more important by the time we take into account the importance of tourism sector for the economy, especially in developing countries, but also in high-income countries.

We also emphasize in the importance of having high enough military expenditure in risky countries with the objective of mitigate the effects of terrorism by giving and strong safety image abroad. Moreover, our results show that not spending enough military budget could be even negative for tourism.

On the other hand, countries must be also prepared to receive more tourists if other countries are beaten by terrorism. Moreover, terrorism affected countries must also be conscious about the possible reduction of tourism and its consequent effects for their economies. In that sense, political stability of the country can also play an important role to reduce the effects of attack on tourism sector. According to our results, developing strong political, institutional, social and economic institutions definitely help to face attacks.

Finally, the recent attacks in Europe, would probably weigh more in considering additional measures to defend tourism from terrorist.

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflict of interest.

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