INVITED ARTICLE

The influence of terrorism in tourism arrivals: A longitudinal approach in a Mediterranean country

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ABSTRACT

This longitudinal study examines the impact that terrorist attacks within a representative group of European countries can have on the tourism demand of a South European country with no record of terrorism attacks. In order to analyze the connections between terrorist attacks and tourists' arrivals, occurred between 2002 and the end of 2016, an Unrestricted Vector Autoregressive model was used for multivariate time series analysis. The main results show that terrorist attacks have a strong impact on tourist arrivals and confirm the existence of terrorism spillover, namely the substitution and generalization effects phenomena.

Introduction

Terrorism has become an important and recurring topic in the public discourse over the last decades due to the increased frequency of terrorist attacks witnessed (National Consortium for the Study of Terrorism and Responses to Terrorism, 2019). Since the beginning of the century, and particularly over the last 10 years, several developed and stable countries have witnessed high levels of terrorist events (Lanouar & Goaied, 2019). New York, United States (2001), Madrid and Barcelona, Spain (2004, 2017), London and Manchester, United Kingdom (2005, 2017), Tuusula, Finland (2007), Apeldoorn, Netherlands (2009), Utoya, Norway (2011), Paris and Nice, France (2015, 2016, 2017), Brussels, Belgium (2016), Sousse, Tunisia (2015), Berlin, Germany (2016), Istanbul, Turkey (2016, 2017), Christchurch, New Zealand (2019), Colombo, Sri Lanka (2019) were some of the places that have experienced terrorist attacks, but the list goes on (National Consortium for the Study of Terrorism and Responses to Terrorism, 2019). Revolutionary and destructive groups carry out attacks all over the world every single day, transforming terrorism into a constant in modern life (Coca-Stefaniak & Morrison, 2018).

According to the "Prospect Theory" (Tversky & Kahneman, 1992), tourists are rational consumers who, when confronted with two different options, tend to choose the option that will bring them more potential gains and lower risk (Seabra, Kastenholz, Abrantes, & Reis, 2018). When tourists perceive the existence of any risk of terrorism, they become more careful as they plan their travel and tend to adopt risk-reducing strategies (Fuchs & Reichel, 2011). Tourists are sensitive to terrorism threats and can be flexible in their destination choices (Neumayer & Plümper, 2016), so they will avoid destinations they believe to be connected with that sort of threat (Rittichainuwat & Chakraborty, 2009).

Markets are increasingly global due to a combination of economic, socio-cultural, political, and technological factors. The world is

turning into a single market, which leads to the standardization of consumer lifestyles and the rising of "Global Consumers" (Hollensen, 2011). Tourism is one of the most global economic activities and is, therefore, vulnerable to risks that affect any other global business (Fennell, 2017). The world has become interdependent and tourism crises in one part of the world can have strong repercussions on other locations (Lanouar & Goaied, 2019; Ritchie, 2004). When tourists realize that a destination is unsafe, they replace it with others they consider safer and, in doing so, may damage entire regions that are affected by violence or that tourists consider threatened by terrorism (Beirman, 2003; Gu & Martin, 1992; Lutz & Lutz, 2018; Mansfeld, 1996; Sönmez, 1998). This fact draws attention to the spatial patterns of terrorism impacts caused by spillover effect on destinations/regions (Öcal & Yildirim, 2010).

The topic of terrorism spillover effects has produced a considerable amount of literature (Veréb, Nobre, & Farhangmehr, 2018). The decline in tourists' arrivals and receipts caused by terrorism is well documented in several countries and regions since the 90s and has affected countries like Spain (Enders & Sandler, 1991), European countries ((Enders, Sandler, & Parise, 1992; Radić, Dragičević, & Sotošek, 2018), the Mediterranean region (Drakos & Kutan, 2003), non-democratic countries and Africa (Blomberg, Hess, & Orphanides, 2004), the USA (Bonham, Edmonds, & Mak, 2006; Goodrich, 2002), Israel (Eckstein & Tsiddon, 2004; Fleisher & Buccola, 2002; Morag, 2006; Pizam & Fleischer, 2002), Italy (Greenbaum & Hultquist, 2006), Nepal (Baral, Baral, & Nigel, 2004), Ireland (O'Connor, Stafford, & Gallagher, 2008), Fiji and Kenya (Fletcher & Morakabati, 2008), Nigeria (Adora, 2010); Turkey (Feridun, 2011; Ozsoy & Sahin, 2006), Pakistan (Raza & Jawaid, 2013), the Middle East (Bassil, 2014), the Caribbean (Lutz & Lutz, 2018), Tunisia (Lanouar & Goaied, 2019), and worlwide (Liu & Pratt, 2017; Llorca-Vivero, 2008; Neumayer & Plümper, 2016).

Despite all past research conducted on the impacts of terrorism on tourism industry, and bearing in mind recent disturbing events, many sectors are calling for further in-depth analysis of this issue (Almuhrzi, Scott, & Alroiyami, 2017; Saha & Yap, 2014). People have to learn how to deal with the changes that this new global terrorism context is bringing to tourism (Veréb et al., 2018) and it is crucial to find ways to cope with the disruption in tourist flows in the wake of terrorism events (Cohen & Cohen, 2012). More investigation is required on the impact that terrorism may have on tourist arrivals and it will have to take into account the changes that are affecting the spatial patterns of tourism flows and, specifically, the spillover effects of terrorism (Neumayer, 2004; Prideaux, 2005).

While most empirical studies report the negative spillover effects on tourism demand and receipts caused by the substitution effect affecting countries and regions suffering from terrorism activity, there is no study, to our knowledge, dealing with the effects those events have on a safe country with no record of terrorism attacks. Portugal is currently one of the most popular European tourist destinations (World Tourism Organization, 2018) and has no history of terrorist attacks ever (National Consortium for the Study of Terrorism and Responses to Terrorism, 2019). The country is considered the third most peaceful country in the world by Global Peace Index (Institute for Economics & Peace, 2018) and clearly benefits from this safe tourist destination image.

The main goal of this study is to analyze the influence that terrorist attacks carried out in a representative group of European countries can have on a safe country. This particular study will focus on Portuguese tourism demand and will take into account the possible consequences of the so-called spillover effect, particularly the substitution and generalization effects. This paper begins with an outline of the current literature available on tourism consumer behavior regarding terrorism risk and the spillover effects caused by terror. The literature review was used to develop the study's conceptual framework. Discussion on the research methodology was the next logical step. Using a longitudinal study, this work uses an Unrestricted Vector Autoregressive model to test the conceptual framework. Arguments about theoretical and management implications are discussed in the last part of the article. The results of this study demonstrate the existence of the so-called substitution effect caused by terrorism events and add information to the existing literature about the spatial spillover effects of terrorism on tourism activity. It was also possible to create a Tour-Terror index allowing managers to observe the potential impacts of attacks on tourists' arrivals and receipts in different regions.

Theoretical background

The definition of terrorism is troublesome. According to previous research (Lutz & Lutz, 2018) terrorism is conceptualized, in the Global Terrorism Database, as "the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation" (National Consortium for the Study of Terrorism and Responses to Terrorism, 2019). Terrorism attacks generally "appear to be random and dispersed in order to create tension in the widest possible audience" (Öcal & Yildirim, 2010, p. 481). Tourism demand, as previously established, is particularly sensitive to terrorist attacks, since tourists' choices value safety, tranquility and peace (Araña & León, 2008). Past research has repeatedly proved the strong exposure of tourism industry to terrorism and violence and showed that tourism is one of the economic sectors that are most vulnerable to this threat (Araña & Leon, 2008; Avraham, 2015; Lanouar & Goaied, 2019; Saha & Yap, 2014). Several studies have proved its negative impacts on tourism activity as a whole in the short and long term (Araña & León, 2008; Baker, 2014; Liu & Pratt, 2017; Pizam & Smith, 2000; Sönmez, 1998). This is mainly because of the effects that terrorist threats have on tourists' decision-making process (Neumayer, 2004; Pizam & Fleischer, 2002; Ritchie, 2004; Seabra, Abrantes, & Kastenholz, 2014; Seabra et al., 2018; Sönmez, Apostolopoulos, & Tarlow, 1999; Sönmez & Graefe, 1998).

Safety is clearly one of tourists' main concerns. It is a basic human need. As such, it affects human behavior in general and consumer behavior in particular (Isaac & Velden, 2018). When people travel, they do not want to feel exposed to situations that will threaten their integrity. Tourists are concerned with travelling to a destination where they will be able to fulfill their desires with as little complications and threats to their safety as possible (Seabra, Dolnicar, Abrantes, & Kastenholz, 2013). Safety on vacation and leisure is an expected requirement for any visitor in any destination (Baker, 2014). Therefore, stability is one of the key factors for the development of tourism industry (Almuhrzi, Scott, & Alroiyami, 2017). If some event disrupts this balance and causes a risk perception among tourists, it can have both a powerful and negative impact on demand.

Risk perception relates to the uncertainty of consequences and potential loss (Dholakia, 2001) and is associated with a large number of factors that may influence tourists' decision making. Since the first studies on leisure and travelling, seven types of risk perceptions have been considered (Rohel & Fesenmaier, 1992): i) psychological: how travel will affect one's own self-image; ii) social: impacts on social image; iii) financial: the value of money; iv) time: the cost of the time wasted while planning and travelling; v) physical: impacts on physical and psychological wellbeing; vi) satisfaction: probability of experiencing some kind of dissatisfaction with the trip or one of its components; and vii) functional: associated with bad trip organization and malfunction of tourist equipment or transportation.

Those risks are associated with three travel dimensions: vacation risk, physical-equipment risk and destination risk. Focusing specifically on the risk factors connected with tourism destinations, subsequent research drew attention to more specific issues such as: i) health: factors that may cause physical danger, injury or sickness (Baker, 2014; Jonas, Mansfeld, Paz, & Potasman, 2011); ii) communication: language and communication barriers that may hinder the connections with locals or service providers (Reisinger & Mavondo, 2005); iii) natural disasters: the exposure to natural hazards (Becken & Hughey, 2013; Pearlman & Melnik, 2008); iv) crime: several forms of criminality and physical violence (Brunt, Mawby, & Hambly, 2000; Chesney-Lind & Lind, 1986; Dimanche & Leptic, 1999; Michalko, 2004); v) political instability and violence (Fletcher & Morakabati, 2008; Ioannides & Apostolopoulos, 1999; Saha & Yap, 2014; Sönmez, 1998; Yap & Saha, 2013); and vi) terrorism: probability of being involved in a terrorist attack (Baker, 2014; Lanouar & Goaied, 2019; Saha & Yap, 2014; Seabra et al., 2014).

Terrorism and political instability are the threats that tourists fear the most (Sönmez, 1998). In fact, the younger generations rank "war, terrorism and political tension" as their top concerns (Coca-Stefaniak & Morrison, 2018). Previous research reports that terrorism and political instability are "particularly intimidating risks due to the uncontrollable, involuntary and random nature of the potential harm involved in visiting destinations struck by such incidents" (Kapuściński & Richards, 2016, p. 235; see also Cavleck, 2002; Heng, 2006).

That way, the perceived risk of terrorism is more effective and will influence tourists' behaviors and decision-making, regardless of their country of origin or of their cultural background (Seabra et al., 2018). Feridun (2011) suggests the existence of a negative causal effect of terrorism on tourism. Raza and Jawaid (2013) also proved the unidirectional causal relationship between terrorism and tourism. In their opinion, there is a unique direction of causality that goes from terrorism to tourism.

The changes in tourists' decision making caused by perceived risks of terrorist attacks are mainly due to the so-called memory effect. Memory effect means any feeling, apprehension, or panic that lead individuals to change their usual behaviors (Shin, 2017). People create a memory effect after experiencing or after hearing about devastating events that have occurred in a certain place. Terrorist events can give rise to a great sensitivity between the tourists' initial memory of a destination and the posterior image of such destination. This leaves a persistent recollection or memory effect (Baggio & Sainaghi, 2011). Past attacks directly influence tourist arrivals in the affected countries due to those negative memories. Consequently, tourists will replace their usual leisure destinations with other places they consider safer (Lutz & Lutz, 2018). Eventually they will return to their favorite destinations and this is the reason why this memory effect is not permanent, although its effects may last for quite a long time as stated in previous research (Baggio & Sainaghi, 2011).

Tourists show a high preference for more stable and peaceful geographic areas (Araña & León, 2008; Neumayer, 2004; Reisinger & Mavondo, 2005) since their main goal is to relax in an insouciant holiday environment (Neumayer, 2004). They have a big range of destinations available and, normally, they do not even consider travelling to places located near sites where risky incidents have occurred. They choose alternative destinations with similar characteristics but with a more stable environment (Neumayer, 2004). This has some negative economic impacts not only on the affected destinations (Lanouar & Goaied, 2019; Sönmez et al., 1999), but also on other nearby places. This is due to the spatial spillover effects (Isaac & Velden, 2018; Walters & Beirman, 2017) that will affect several destinations and entire regions (Radić et al., 2018). According to the Institute for Peace Economics (Institute for Economics & Peace, 2016), the contribution of the tourism sector to gross domestic product in 2015 was twice larger in countries where there had been no occurrence of terrorist attacks targeting tourists. Between 2008 and 2014, tourism average contribution to gross domestic product growth reached 3.6% in countries that had experienced no terrorist attacks against tourists. In countries where attacks deliberately targeted tourists, it amounted to 1.9% only. Nowadays, safety is one of tourists' major concerns when they have to choose their travel destination (World Tourism Organization, 2018).

Spatial spillover effects of terrorism on tourism activity: generalization and substitution effects

Spillover effect, a term which comes from economics, refers to the positive or negative externalities that an economic activity can have on any element not directly associated with that given activity. In tourism, spillover effects are closely related to a spatial perspective. It refers to the inadvertent effects that the tourism industry of a certain region has on tourism flows to other regions. Positive spillover effects occur when a region benefits from their neighbors' tourism growth, while the opposite can occur when a destination is affected by negative factors occurred in neighboring regions (Yang & Wong, 2012). Previous research on the spillover effects found the existence of two major impacts of terrorism on tourism industry: the generalization and the substitution effects.

The generalization effect

The "generalization effect" refers to the cognitive biases of tourists who tend to generalize the perceived image of a given destination to a whole region (Saha & Yap, 2014). The generalization effect may cause completely safe countries to witness strong drops in their tourism arrivals and revenues as a result of insecurity episodes in nearby countries (Enders et al., 1992). Empirical

evidence showed that perceptions of terrorist threats, war, political instability, and violence in one country tend to make tourists assume that entire regions are risky (Sönmez, 1998; Walters & Beirman, 2017). Although some studies have shown that neighboring countries can sometimes benefit from being considered immediate substitutes, it has also been proved that there is always a negative impact on tourist demand in the region where the incident has occurred (Gu & Martin, 1992).

Mansfeld (1996) proved that tourists who had experienced terrorist events during the Arab-Israeli conflicts transferred their fear of terrorism to the Middle East as a whole. This spillover effect resulted in a negative contagion effect in that region but, on the other hand, had a positive impact on the tourist activity of the Mediterranean area. Neighboring countries, or countries that share identical characteristics, gain tourists in the same proportion as the less safe countries lose visitors. The different patterns of substitution that affect destinations are commonly represented by concentric rings. The "inner ring" that includes more unstable destinations like Egypt, Israel, Jordan, Lebanon, and Syria was replaced by an "outer ring" composed of more peacefull and terrorism-free countries, such as Cyprus, Greece and Turkey (Mansfeld, 1996).

Wahab (1996) drew attention to the fact that intraregional tourists may be more sensitive to this effect since they seek more peaceful destinations located near places considered to be of higher risk. In his study, he claimed the existence of a positive spillover effect in the case of Egypt. However, an interregional tourist may also generalize conflict to an entire region, which may explain the decline in tourist arrivals in Iraq's neighboring countries during the Gulf War (Sönmez, 1998). During that period, Middle East and Eastern Mediterranean countries experienced a big decline in tourist arrivals. Cyprus, for example, experienced a drop of 3.38 million visitors in 1990 and of 2.94 million in 1991 as a result of the perceived risk of terrorism and political instability (Goodrich, 2002). Drakos and Kutan (2003) stated that any terrorist or violence event taking place in a particular Middle Eastern and North African destination will naturally affect tourist's perceptions of another country in that region (Drakos & Kutan, 2003).

Some years later, Kozak and his colleagues also concluded that tourists form overall negative images of entire regions due to terrorism acts (North America and the Middle East), health issues (Severe acute respiratory syndrome in Asia) and political conflicts (Africa). Tourists change their travel plans when they realize the existence of any potential threat or risk. They assume that incidents that take place in a specific country will affect its neighboring countries as well. This assumption results in a global devastating impact on the region (Kozak, Crotts, & Law, 2007).

Recently, more empirical evidence supported findings that random terrorism acts perpetrated in some countries have an impact on nearby areas not directly subject to such attacks. This was true for Kenya, Africa (Masinde, Buigut, & Mung'atu, 2016) and Jordan because the violent uprisings in neighboring countries have deeply affected the image of the whole geographic area (Liu, Schroeder, Pennington-Gray, & Farajat, 2016).

The substitution effect

The "substitution effect" in tourism refers to customers' tendency to replace one destination with another, due to a number of factors that include changes in the elasticity of demand, shifts in price, a desire to try new products or experiences (Tribe, 1995) or because of risk perception (Prideaux, 2005).

Using an Unrestricted Vector Autoregressive model to analyze monthly data for Spain covering a period of time between 1970 and 1988, Enders and Sandler (1991) identified negative unidirectional causality between terrorism attacks perpetrated by the separatist basque group ETA and tourism activity in the country. The authors concluded that the biggest drop in tourists' arrivals occurred three months after the attacks and that a typical transnational terrorist incident can prevent about 1400 tourists from visiting a certain country (Enders & Sandler, 1991). Enders et al. (1992), a year later, studied a large sample of European countries between 1974 and 1988 and determined that tourism reactions occurred mostly within a period of six to nine months after the incident and that there was clear evidence of the replacement of those destinations with others located in different regions (Enders et al., 1992).

Gu and Martin (1992) analyzed the substitution effect based on tourist arrivals at Orlando airport between 1971 and 1984. The authors concluded that there was a direct correlation between the increase in terrorist attacks in the Middle East and in Europe and the number of arrivals recorded at that airport (Gu & Martin, 1992).

During their analysis conducted on three Mediterranean countries – Greece, Israel and Turkey –, using Italy as a control variable, Drakos and Kutan (2003) tested the cross-country effects of terrorism on tourism in the Mediterranean region between 1991 and 2000. They concluded that the intensity of terrorism events, measured according to the location (urban *vs* rural) and the number of fatal casualties, led to shifts in tourist visits that caused positive and negative spillover. The country where the attack took place registered drops in tourist arrivals, while other nearby countries experienced an increase in their visitors. Their empirical results revealed that Israeli and Turkish tourism industries are more sensitive to terrorism than their Greek counterpart (Drakos & Kutan, 2003).

A study conducted on tourism flows after 9/11 in the United States and in Hawaii reinforced the findings of earlier studies that showed the existence of that substitution effect. Tourists change their travel plans instead of canceling them, giving priority to safer domestic destinations they perceive as less risky. The study results indicate that United States citizens replaced international destinations with Hawaii balancing the significant drop of foreign arrivals that followed the 9/11 events (Bonham et al., 2006). Focusing on the same period, Araña and León (2008) used a discrete choice approach to assess the impact those worldwide events had on the way tourists evaluate the qualities of alternative and competing destinations located in the Mediterranean area. The authors concluded that countries with higher proportion of Islamic population, such as Tunisia and Turkey, suffered a more severe negative impact on their competitive value than other destinations, such as Canary Islands and the Balearics, where this proportion was lower (Araña & León, 2008).

Using two estimation techniques, Neumayer (2004) tested the impact of various forms of political violence on tourism. The cross-

country analysis provides empirical evidence for intraregional, negative spillover and cross-regional substitution effects for countries where human rights are violated or where there is evidence of conflicts and other politically motivated violent events. The author concluded that tourists choose alternative destinations with similar characteristics but that are more stable (Neumayer, 2004).

While examining the effects of terrorism on tourism activity in Turkey, Yaya (2009) found strong evidence that terrorism events in the country have affected the industry and that the Madrid bombings had a positive effect on tourist arrivals in Turkey. This happened because tourists perceive those two countries as close substitutes for one another (Yaya, 2009). Other studies concluded that while some countries experience a negative indirect effect, terrorist attacks increase tourism demand in other neighboring countries that are known for their low or moderate risk level (Saha & Yap, 2014). This is the case of Dubai, for instance, that represents a safe regional alternative to Lebanon or Syria, two former popular tourism destinations destroyed by war (Clancy, 2012).

A study dealing with the reactions of German tourists to unanticipated shocks and the respective impacts on risk perception and tourism destination selection analyzed several terrorism episodes: 9/11 (2001), Egypt (1997), Tunisia (2002), Morocco (2003) and Indonesia (2003). The findings proved that those shocks heavily affected Islamic countries and provided a temporary substitution effect in favor of (Southern) European countries (Ahlfeldt, Franke, & Maennig, 2015).

Neumayer and Plümper (2016) apply a model to explain tourists' arrivals using a lagged dependent variable and other lagged independent variables representing terrorist attacks proxies. Using a spatial dyadic approach, the authors concluded that terrorist attacks on tourist destinations in a given country reduce tourist flows due to a substitution effect that is visible at several levels: i) from the countries in which the attacks took place and other similar source markets to a different destination or country; and ii) from the same tourism source market to other similar destinations (Neumayer & Plümper, 2016).

Study methods

As stated, to this day there has been no record of terrorist events in Portugal. Other European countries such as Luxembourg, Monaco, Lithuania, Andorra, Malta, Montenegro, San Marino, and Slovenia are safe countries as well. However, none of these countries kept a record of tourism arrivals or receipts. With a large international recognition and several tourism awards granted to its many regions, cities and destinations, Portugal has been one of the countries with the best performances in tourism. The country has experienced an average annual growth of 11% in tourists' arrivals since 2010 (World Tourism Organization, 2018). In 2017, Portugal received > 14.5 million international tourists and 9.3 million domestic tourists. The arrivals had a massive impact on tourism receipts that have been growing in a sustained way over these last few years and amounted to > 17 billion American dollars in 2017 (Instituto Nacional de Estatística, 2019; World Tourism Organization, 2018). This growth is directly connected to the strategic positioning of the "Destination Portugal" brand that, in recent years, has brought Portugal and other specific Portuguese destinations several international awards. Over the last years, Portugal has won several international awards at the World Travel Awards: i) Portugal "World's best tourist destination" (for the 3rd year in a row); (ii) Lisbon "World's Best Citybreak destination"; iii) Madeira "The Best Insular destination" (for the 4th year in a row); iv) Sintra-Monte da Lua Parks "The Best example of Heritage Recovery"; v) Portugal "The Best European and World Golf Destination" (for the 5th year in a row); vi) "Turismo de Portugal" considered the World's Best Tourism Organization, among many others.

The image of Portugal as a safe tourism destination has led to an exponential increase in tourist arrivals. In fact, Portugal was the third safest country in the world in 2017 (Institute for Economics & Peace, 2018) and is currently a huge European tourist attraction. Portugal was the country chosen for this study because of its importance and potential and especially because it is regarded as a safe country with no record of terrorist events since ever.

In the next subsections, sample and data will be presented. Data includes tourists' arrivals in Portugal, sorted by region of origin, and the number of terrorist attacks that have occurred in the selected European countries, from 2002 to the end of 2016.

Sample and data

The main database that supports this study was built upon two different time series sub-databases: i) tourism arrivals in Portugal between 2002 and 2016 and ii) the terrorism events occurred worldwide during the same time period.

The first sub-database was obtained from the Portuguese public statistical entity (Instituto Nacional de Estatística, 2019). Data provided information about the number of tourists who stayed in any accommodation facility in Portugal, between 2002 and the end of 2016, sorted by region of origin. A reasonable medium-term time series is required if the analysis applies lagged variables (Bell & Jones, 2015) to achieve significant results.

The number of guests has significantly increased, surpassing 21 million tourists in 2016 (see Fig. 1). The compound annual growth rate from 2002 to 2016 was 4.78%, and the number of tourists doubled during that period. Over the last 5 years, tourists coming from Europe have exceeded the number of domestic tourists. These results reveal the increasing dynamics of the Portuguese tourist sector and reflect the country's good and stable political, economic, and social environment.

Data collected regarding tourists' arrivals included all contributing countries and showed that the most representative emission markets in Portugal are: Europe – the United Kingdom, Spain, France, and Germany; Africa – Angola; America – Brazil, the United States, and Canada; Asia – China and Japan (Instituto Nacional de Estatística, 2019).

The second sub-database, obtained from Global Terrorism Database (National Consortium for the Study of Terrorism and Responses to Terrorism, 2019), gathers information about terrorist attacks per country and other aggregate geographic areas between 2002 and 2016 (see Table 1). Terrorist attacks, according to Global Terrorism Database, are violent incidents triggered by bombing or explosion, arm attacks, assassination, and facility/infrastructure attack caused by terrorist organizations or individuals in a domestic
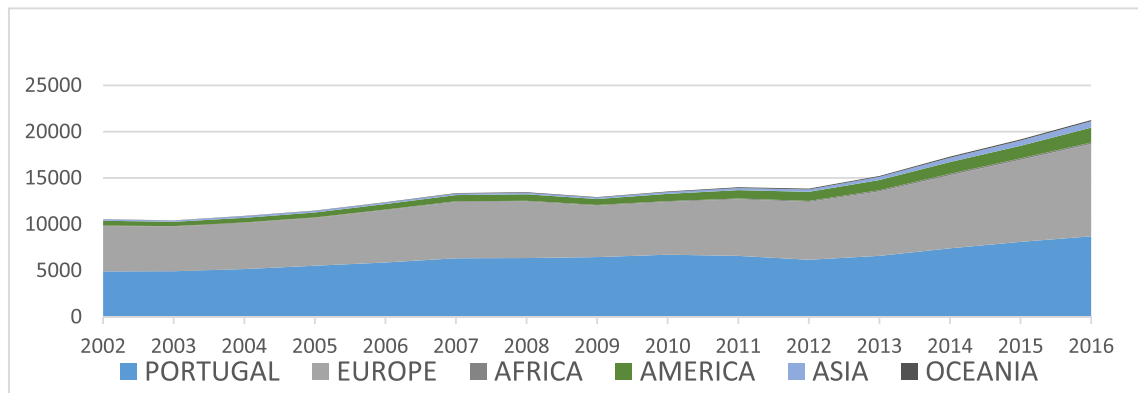
Fig. 1. Total Tourists in Portugal sorted by region of origin (2002 to 2016) (thousands)
Source: Instituto Nacional de Estatistica, 2018.

as well as in a transnational and international context. For each Global Terrorism Database incident, information is provided on the date and location of the incident, the weapons used and the nature of the target, the number of casualties, and, when identifiable, the group or individual responsible for the attack (National Consortium for the Study of Terrorism and Responses to Terrorism, 2019). Table 1 provides information about the number of terrorist attacks sorted by country, considering also the injuries and fatalities caused by the events.

The main criterion to select the considered countries was the number of terrorist attacks they have experienced between 2005 and 2016. The selected countries represent the biggest terrorist targets for each European region, as seen in Table 1 (highlighted in light gray). However, some representative countries were selected to avoid multicollinearity. Those were countries with the highest rate of terrorist attacks and that had some potential connection with Portugal (social, economic or tourist connections). The importance of those countries as emissive markets was also taken into consideration.

Keeping in mind the tourism regions considered by World Tourism Organization (World Tourism Organization, 2018), the sample includes the United Kingdom, for Northern Europe; the Western Europe sample includes France and Germany; the Central/Eastern Europe sample incorporates Russia – Russia and Ukraine attacks are highly correlated, so this tourism market was an obvious choice – and lastly Israel, Greece, and Spain were part of the Southern/Mediterranean Europe sample. Israel was chosen over Turkey considering that Turkey is strongly correlated with Germany that represents an important tourist market for Portugal.

In addition to being the countries with a higher incidence of terrorist attacks, France, England, Germany, Greece, and Spain are countries that, along with Portugal, belong to the European Union. They also have ancient and strong foreign commercial relations with Portugal (Base de dados Portugal Contemporâneo, 2019a). The first three countries considered are destinations chosen by many Portuguese emigrants. Therefore, strong communities have been created over the years and strong social relationships were established between different generations of families living both in their home countries and in the different host countries (Base de dados Portugal Contemporâneo, 2019b). Those are, furthermore, the most relevant emission markets to Portugal.

As for Central/Eastern Europe, Russia was the country that registered the higher number of attacks. Portuguese relationships with Russia date back to 1739 (Russian Federation, 2019) and those relationships are strengthened by commercial links (oil and gas imports) (Belyi, 2003). Currently, a large number of Russian tourists choose Portugal as their tourism destination. They represent an important asset for tourism due to their number and to their high purchasing power.

As far as the South /Mediterranean Region is concerned Israel is, along with Spain and Greece, the country that has experienced more terrorist attacks. Portugal established diplomatic relations with Israel in 1977 and those relations were reinforced in 1992 with the signing of cultural, economic, industrial, technical, and scientific cooperation agreements (República Portuguesa, 2019).

Model specification

The main goal of this study is to analyze the potential connections between terrorist attacks in specific European countries and tourist arrivals in Portugal. The countries' political and economic stability, safety and security can be advantages that may attract tourists who have proven to be loyal to destinations that have recently been targeted by terrorist attacks. This study follows the procedure applied by Neumayer and Plümper (2016) when they used lagged dependent variables. The information about the number of terrorist attacks occurred in a certain country was also taken into account to provide an explanation on tourist arrivals per country of origin.

The conceptual autoregressive model has two distinctive independent variables' groups. (1) One is related with the one-lag period and the two-lag period of the first differences (t - t_{-1} period) of the dependent variable values *tourist arrivals from any continent* or an autoregressive variable. The second, (2) is related with the first differences (t - t_{-1} period) of the one-lag period values of attacks perpetrated against the 7 selected countries, as described in Fig. 2.

Then, evidence was collected to prove that all the series were non-stationary at levels (time periods) using Kendall's Tau statistic indicator, also known as Dickey-Fuller test (Gujarati, 2009). Ordinary least squares cannot be trusted because they may cause

Table 1

Terrorist attacks sorted by country considering the severe outcomes caused - Injured and Fatalities (2002–2016).

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Total		
	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	I	F
Northern Europe	21	58	5	28	9	22	47	23	66	55	86	165	141	192	139	1057	1179	181
Denmark	0	0	0	0	0	0	1	0	1	0	0	1	0	5	1	9	11	3
Finland	0	34	0	0	0	1	1	0	0	0	0	0	0	9	3	48	36	9
Iceland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ireland	0	0	0	0	1	1	5	0	4	4	30	27	33	28	15	148	15	3
Norway	0	1	0	0	1	0	0	0	1	3	0	0	0	0	0	6	76	77
Sweden	0	0	0	3	1	0	1	1	3	1	2	0	5	36	16	69	8	5
United Kingdom	21	23	5	25	6	20	39	22	57	47	54	137	103	114	104	777	1033	84
Western Europe	40	13	14	36	39	23	24	18	5	22	70	14	31	103	83	535	1515	357
Austria	0	0	0	0	1	1	7	3	0	1	0	0	0	0	3	16	9	1
Belgium	3	8	0	0	0	1	0	1	0	0	1	0	2	0	6	22	300	41
France	32	0	11	33	34	16	13	9	3	8	65	12	15	36	26	313	992	270
Germany	3	2	3	3	4	3	3	4	1	8	4	0	13	64	41	156	196	36
Luxembourg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Monaco	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Netherlands	2	3	0	0	0	0	1	1	1	2	0	0	1	3	6	20	15	9
Switzerland	0	0	0	0	0	2	0	0	0	3	0	2	0	0	1	8	3	0
Central/Eastern Europe	99	85	51	74	63	57	215	188	266	205	176	160	961	672	138	3410	8554	5205
Armenia	0	0	0	0	0	1	0	1	0	0	0	1	0	2	2	7	3	7
Azerbaijan	1	0	0	0	0	1	2	2	0	0	0	0	3	0	2	11	18	7
Belarus	0	0	0	0	0	0	1	0	2	1	3	0	0	0	0	7	212	13
Bulgaria	1	0	0	0	0	0	2	0	0	2	2	3	1	2	1	14	31	9
Czech Republic	0	1	0	0	0	0	2	1	0	1	0	1	5	4	2	17	26	2
Estonia	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1
Georgia	2	6	3	6	3	0	33	25	7	3	3	2	2	0	4	99	161	42
Hungary	0	0	0	0	0	0	2	1	0	0	0	0	0	0	1	4	2	2
Kazakhstan	0	0	0	0	0	0	1	0	0	5	4	4	0	0	3	17	19	26
Kyrgyzstan	2	1	0	2	3	1	0	0	1	1	0	0	2	2	4	19	14	7
Latvia	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0
Lithuania	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	0
Rep. Moldova	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	3	49	2
Romania	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0
Russian Federation	89	76	43	63	56	51	170	152	251	188	151	144	48	21	54	1557	5180	2800
Slovakia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0
Tajikistan	0	0	0	1	0	1	0	1	1	0	5	0	1	3	1	14	44	21
Turkmenistan	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	3	3
Ukraine	3	1	0	0	0	1	1	2	4	3	8	5	898	637	60	1623	2717	2213
Uzbekistan	0	0	5	2	0	0	0	2	0	0	0	0	0	1	0	10	71	50
Southern/Medit.Europe	150	112	85	122	171	113	277	196	99	117	272	157	439	534	639	3483	12,352	3313
Albania	0	1	0	0	0	0	0	1	0	0	0	1	2	4	2	11	2	1
Andorra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bosnia & Herzg.	3	1	0	1	1	2	4	1	2	1	0	1	4	5	0	26	30	8
Croatia	0	0	0	1	0	0	2	1	0	0	0	2	0	0	0	6	5	0
Cyprus	0	0	1	0	0	1	0	0	0	0	1	9	5	3	2	22	0	0
FYR Macedonia	8	5	0	0	3	1	9	1	0	0	1	0	3	4	0	35	25	10
Greece	11	12	4	6	23	15	53	115	49	11	22	53	26	31	31	462	56	76
Israel	75	38	19	43	77	53	134	36	14	51	65	37	293	58	50	1043	3511	814
Italy	7	15	3	6	4	0	2	4	10	3	10	7	7	5	11	94	76	4
Malta	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0
Montenegro	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	2	0	0
Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
San Marino	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Serbia	0	0	0	0	0	0	4	3	1	0	3	0	0	0	0	11	8	3
Slovenia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain	41	21	31	24	23	11	37	21	3	0	1	5	4	1	3	226	2132	238
Turkey	5	19	27	41	40	29	32	13	20	51	169	42	94	421	540	1543	6507	2159
	310	268	155	260	282	215	563	425	436	399	604	496	1572	1501	999	8485	23,600	9056

Source: National Consortium for the Study of Terrorism and Responses to Terrorism, 2018.

A – Number of Attacks.

I – Number of people injured in the attacks.

F – Number of fatalities in the attacks.

Model Tourist and Terrorist Attacks

$(Tour\_Fr\_Continent_t - Tour\_Fr\_Continent_{t-1}) = \beta_0 + \beta_1.L(Tour\_Fr\_Continent_t - Tour\_Fr\_Continent_{t-1}) + \beta_2.L2(Tour\_Fr\_Continent_t - Tour\_Fr\_Continent_{t-1}) + \beta_3.L(At\_Germany_t - At\_Germany_{t-1}) + \beta_4.L(At\_Israel_t - At\_Israel_{t-1}) + \beta_5.L(At\_UnitedKingdom_t - At\_UnitedKingdom_{t-1}) + \beta_6.L(At\_Rússia_t - At\_Rússia_{t-1}) + \beta_7.L(At\_Spain_t - At\_Spain_{t-1}) + \beta_8.L(At\_France_t - At\_France_{t-1}) + \beta_9.L(At\_Greece_t - At\_Greece_{t-1}) + \varepsilon_t$

Where: Tour_Fr_Continent means the tourists from Europe, Asia, America, Africa, Oceania and from Portugal in each individual regression. The variables in brackets mean the first difference among annual values of the variables, L is lag period 1, L2, lag period 2, β the variable coefficient, t the time, At_… represents the number of attacks and ε the error term.

Fig. 2. Specification models used in the estimation.

spurious (non-sense) regressions. Therefore, differencing the series to make them stationary can be a solution, but it could cause the loss of important long run relationships between levels (Gujarati, 2009). Co-integration tests were also performed and led to negative results. Thus, and in accordance with previous works, it became clear that an Unrestricted Vector Autoregressive model, using first difference variables would be the best solution (Esso, 2010; Gospodinov & Pesavento, 2013; Toda & Yamamoto, 1995) to resolve potential non-stationarity series problems (Shin, 2017).

The Unrestricted Vector Autoregressive model method resembles simultaneous-equation modeling as it considers several endogenous variables together. Nevertheless, each endogenous variable is explained by its lagged values or past lagged values. The first difference between the variables and their respective lagged values were used towards non-co-integration and non-stationarity at levels (StataCorp, 2013). The Unrestricted Vector Autoregressive model assumed that all the attacks against the respective countries were exogenous variables in the model. It also considered that there were no or few relationships among them and that the aim would be to study one-way causality relationship between attacks and tourists' arrivals in Portugal and not the opposite.

Since there may be a time lag (one or two-year delay effect) in the impact caused by the terrorist attacks on tourists' arrivals, this study opts to use a one period and a two-period time lag. The study also includes post estimation robustness tests for autocorrelation (Lagrange-multiplier test) (StataCorp, 2013) and residual distribution tests, like the Jarque–Bera test (Lutkepohl, 2005).

Fig. 2 shows the specification models used in the estimation. A Granger Causality test is used (Asteriou & Hall, 2015; Zivot & Wang, 2007), suggesting that there is short run causality between the significant independent variables and the dependent variable.

Tourists' arrivals are an endogenous variable because its value is determined within the model. The terrorists' attacks against countries are exogenous variables, since their value is determined outside the model. In other words, they do not depend on tourist arrivals. There is no correlation between terrorist attacks and the error term whose data represents relevant input to the model. The objective of the analysis is to use terrorists' attacks as determinant variables. This is in line with the methodology used by Neumayer and Plümper (2016) in which terrorist attacks are exogenous variables that explain the arrivals of Western tourists to Islamic countries.

Results

Table 2 demonstrates the descriptive statistics of all variables and Table 3 shows the results of the model. Data clearly suggests that tourists' arrivals from any country to Portugal reflect the impact of a certain memory effect. Hence, the first difference of the lagged autoregressive variable is statistically significant with a 0.1% alpha for every equation. The Granger causality test applied to the model, and to its respective sub models, one for each dependent variable, demonstrates the existence of unidirectional causal

Table 2
Descriptive statistics.

Variable	Description	Obs (years)	Mean	Std. Dev.	Min	Max
Tour_fr_PORTUGAL	Portugal incoming Tourists from… (thousand)	15	6378.077	1082.747	4892.801	8691.184
Tour_Fr_EUROPA	Portugal incoming Tourists from… (thousand)	15	6334.904	1503.016	4823.017	9977.248
Tour_Fr_ÁFRICA	Portugal incoming Tourists from… (thousand)	15	91.94513	42.21759	46.881	161.888
Tour_Fr_AMERICA	Portugal incoming Tourists from… (thousand)	15	842.7309	351.6069	467.714	1610.08
Tour_Fr_ÁSIA	Portugal incoming Tourists from… (thousand)	15	268.8082	172.2123	131.834	687.628
Tour_Fr_OCEANIA	Portugal incoming Tourists from… (thousand)	15	67.486	35.99724	22.872	127.673
At_Israel	Terrorist attacks perpetrated in…	15	69.53333	68.05971	14	293
At_UnitedKingdom	Terrorist attacks perpetrated in…	15	51.8	42.57464	5	137
At_Rússia	Terrorist attacks perpetrated in…	15	103.8	67.17908	21	251
At_Spain	Terrorist attacks perpetrated in…	15	15.06667	14.07869	0	41
At_France	Terrorist attacks perpetrated in…	15	20.86667	16.91097	0	65
At_Germany	Terrorist attacks perpetrated in…	15	10.4	17.89972	0	64
At_Greece	Terrorist attacks perpetrated in…	15	30.8	28.39567	4	115

Table 3
Estimation of Unrestricted Vector Autoregressive model – tourists arrivals and terrorist attacks.

	D_Tour_From Asia	D_Tour_from Portugal	D_Tour_From Europa	D_Tour_From Africa	D_Tour_From América	D_Tour_From Oceania
LD_Tour_From...	**0.869*****	**1.071*****	**0.990*****	**3.198*****	**1.269*****	− 0.676
	(4.34)	(7.79)	(5.28)	(20.23)	(3.55)	(−1.11)
L2D_Tour_From	− 0.523	**− 0.912*****	**−1.076*****	**−2.052*****	**−0.447****	− 0.294
	(−0.90)	(−4.28)	(−6.13)	(−20.57)	(−2.75)	(−0.92)
LD.At_Israel	0.276	0.612	**2.276*****	**− 0.0284*****	−0.248[+]	−0.00371
	(1.61)	(1.36)	(4.16)	(−4.23)	(−1.89)	(−0.11)
LD.At_United Kingdom	**1.285***	1.835	**9.096*****	**0.112*****	0.398	0.128[+]
	(2.05)	(1.16)	(5.03)	(5.23)	(0.81)	(1.75)
LD.At_Rússia	− 0.203	− 0.0920	**−3.238*****	**0.371*****	**−0.369***	**−0.0683***
	(−1.25)	(−0.11)	(−4.16)	(16.30)	(−2.24)	(−2.49)
LD.At_Spain	**−2.013****	5.706[+]	**−20.06*****	**0.482*****	**−3.269*****	**−0.322***
	(−2.58)	(1.83)	(−5.91)	(13.85)	(−4.69)	(−2.04)
LD.At_France	0.763 +	**8.565*****	**10.75*****	**0.605*****	**0.927****	− 0.153
	(1.93)	(5.55)	(6.74)	(26.73)	(2.83)	(−1.06)
LD.At_Germany	2.181	7.588	**21.35*****	**1.282*****	**1.948***	0.0118
	(1.17)	(1.45)	(4.25)	(15.46)	(2.21)	(0.09)
LD.At_Greece	**0.767****	**5.136*****	**10.56*****	**−0.101*****	**2.039*****	− 0.141
	(3.28)	(5.54)	(6.21)	(−8.41)	(4.14)	(−0.68)
_cons	− 5.434	123.2*	70.01	**−7.778*****	0.286	**14.60*****
	(−0.73)	(2.45)	(1.43)	(−8.29)	(0.01)	(3.29)
N	12	12	12	12	12	12

Note: + $p < 0,1$; * $p < .05$; ** $p < .01$; *** $p < .001$; D first difference; L, L2 lags of respective variable; first number in the table is the variable coefficient and the second one in the same column is the z statistics.
These are the significant values

relationship between terrorist attacks and tourist arrivals in this country.

The second autoregressive lagged dependent variable has an important impact on tourist arrivals from Portugal, Europe, Africa, and America, but, in contrast, exerts negative impact on the addition of more tourists. Tourist arrivals from Asia are positively related with the attacks perpetrated in Greece, France and in the United Kingdom; however, attacks perpetrated in Spain move those specific tourists away from Portugal and force them to look for other destinations. Portuguese domestic tourists appear to be more sensitive to attacks committed in France, Spain, and Greece. In this case, there is a positive correlation, even if in the case of Spain, the level of significance is slightly over 5%. Terrorist attacks perpetrated in Israel, the United Kingdom, Greece, Germany, and France directly influence tourist arrivals from Europe.

In contrast, terrorist attacks perpetrated in Spain and Russia contribute to dislocate tourists from Portugal to other regions. All variables are significant at the 0.1% level. Even though there is evidence that all variables concerning tourists from Africa are significant at the 0.1% level, the coefficient direction changes in the case of Israel, Russia, Spain, and Greece. In fact, only terrorist attacks that took place in Israel and Greece affect negatively tourist arrivals from Africa in Portugal, while attacks perpetrated in other countries positively influence arrivals in the country. As far as tourists from America are concerned, it seems that attacks in Russia, Israel and Spain move them away from Portugal and force them to choose other destinations, while attacks in France, Germany and Greece bring those tourists to Portugal. Tourists from Oceania are negatively sensitive to attacks committed in Russia and Spain. A phenomenon that involves extremely sensitive reaction to terrorist attacks makes tourists replace a destination with other safer countries. Post estimation tests to the models revealed the absence of auto-correlation after using the Lagrange multiplier test, as null hypothesis of zero autocorrelation could not be rejected and as the null hypothesis under Jarque–Bera statistic of residuals' normality (StataCorp, 2013) could not be rejected either.

Discussion and conclusions

Despite the importance granted to the effects of terrorism on tourism and in spite of a considerable amount of research conducted on such issue, there have been recent calls for new research on the topic, especially on the consequences that this phenomenon can exert on economy and tourism activity (Almuhrzi, Scott, & Alroiyami, 2017; Saha & Yap, 2014). This paper represents an effort to close this gap by establishing the connections between terrorist events in some regions and tourist arrivals in other regions. The study takes into account previous literature on spillover effects, specifically those that trigger the substitution and generalization effects that make tourists reject and replace destinations considered unsafe with others they consider safer (Gu & Martin, 1992; Neumayer, 2004).

Whereas past research analyzes terrorism negative spillover effects on tourism demand, the present study focuses on the effects that terrorism events have on the tourists' arrivals in a safe country that has no record of terrorism attacks. Portugal is one of the European tourism destinations that have experienced a higher growth in tourism demand and receipts over the last decades. According to the Institute for Economics and Peace, Portugal is one of the world's most peaceful countries (Institute for Economics & Peace, 2018) and has no record of terrorism events (National Consortium for the Study of Terrorism and Responses to Terrorism,

2019). The present study demonstrates that terrorist attacks in other countries have an impact on the demand for Portuguese tourist accommodations. In turn, the results also show that instability in other countries can have consequences for Portuguese tourism arrivals confirming the existence of spillover effect.

As far as the effects of terrorist attacks on tourists' arrivals in Portugal are concerned, this study allowed the uncovering of interesting results. Terrorist events perpetrated in the United Kingdom, Greece, and France positively affect tourist arrivals from Asia. Attacks perpetrated in Spain, on the contrary, have a negative contribution to tourists' arrivals from Asia. In the cases of France and Greece, this occurs probably because they are both Mediterranean destinations similar to Portugal. This result confirms the existence of the substitution effect as well as the presence of the generalization effect (Mansfeld, 1996). Asian countries have a strong historic, economic and even social connection with the United Kingdom. Natives of those countries are well aware of the attacks committed in the United Kingdom through media coverage or through personal information provided by emigrants residing in the country. On the other hand, for Asian tourists, Spain and Portugal belong to the same Iberian territory since they are located in the same geographical and risk area. This belief confirms the existence of the generalization effect (Enders & Sandler, 1991).

Terrorist attacks in France, Greece and Spain strongly affect Portuguese domestic tourism. These are important tourism destinations to Portuguese tourists. These results confirm earlier research on unsafety effects and prove that during unsafety times tourists do not stop travelling; alternatively, they choose domestic destinations they consider much safer (Bonham et al., 2006).

Terrorist events perpetrated in the United Kingdom, France, Germany, Greece, and Israel positively affect tourist arrivals in Portugal from European countries. On the other hand, terrorist attacks occurred in Russia and Spain exert a negative impact on tourists' arrivals from Europe. This happens possibly because those countries are geographically located in the Center of Europe. Accordingly, European tourists will choose peripheral countries. This assumption is in accordance with the results obtained by Mansfeld (1996). The United Kingdom, France and Germany are also important emissive markets to Portugal. That means that tourists who come from those parts of the world can feel safer in Portugal than in their own countries. Since they are intraregional tourists, they have enough information to know which countries are the safest (Wahab, 1996). In the cases of tourist destination such as Greece or Israel, the substitution effect involves Portugal, probably because the three markets share the same emissive tourist markets.

Spain and Portugal are neighboring countries. Terrorist attacks in Spain have severe impacts on tourists who come to Portugal from Asia, Oceania, America, and from other European countries. However, tourists coming from Africa, namely from Angola, a Portuguese-speaking African country (PALOP) and member of the Community of Portuguese Speaking Countries (CPLP), or from Portugal are unbiased and, thus, do not feel that effect. For those tourists, Spain and Portugal are two different and unrelated nations, even though they are both Iberian countries.

The overall findings show the existence of the so-called generalization effect (Drakos & Kutan, 2003; Enders et al., 1992; Kozak et al., 2007; Liu et al., 2016; Masinde et al., 2016): a safe country like Portugal with no terrorist events can suffer from the impact of episodes of insecurity that took place in Spain, a neighboring country. Such impact will affect tourism demand. Moreover, this work confirms that the generalization effect that over-assumes the similarities of neighboring countries enhances the causal relationship between terrorist attacks and tourist arrivals (Feridun, 2011; Raza & Jawaid, 2013).

The attacks perpetrated in Russia do not produce changes in the destination choices of tourists coming from European traditional markets and tourists remain faithful to traditional destinations like Spain, France, Italy, Greece, and Tunisia, among others. In consequence, there is a decrease in tourists' arrivals in Portugal. The attacks committed in the United Kingdom, Russia, Spain, France, and in Germany have a positive impact on the increase in tourists from Africa who choose Portugal as their destination. On the other hand, terrorist incidents in Greece and Israel seem to have a negative impact on their choice. These results may be due to the cultural and economic proximity of most African countries and specifically of Angola, which is Portugal's most important African market. Terrorist attacks in Greece and Israel are responsible for the decrease in African tourists' arrivals, probably because instead of coming to Portugal they rather choose high level shopping tourism destinations such as Italy, France, the United Kingdom, and Germany.

Terrorism in Greece, Germany, and France positively affects tourist arrivals from America, while terrorist events occurred in Israel, Russia and Spain will have a negative effect on the number of American tourists who choose Portugal as their destination. The substitution effect is, once again, clear as far as Greece is concerned since that destination is quite similar to Portugal. Germany and France are important markets for Brazilian, North American and Canadian tourists. However, due to the attacks in Germany and France, those tourists decide to come to Portugal instead. Tourists from America are well aware of the repeated and regular instability and unsafety felt in Russia and Israel, so any negative event in those countries will force them to choose other traditional or domestic destinations. These findings are in close accordance with previous research conducted by Pizam and Fleischer (2002).

The influence of the memory effect is clear when past tourist arrivals influence current tourist arrivals. This occurs in all the models except in the case of tourist arrivals from Oceania. This means people want to relive pleasant past experiences and return to destinations where they had spent enjoyable moments. This positive feeling reinforces the role played by memory effect when time comes to choose a destination. Therefore, the present study reinforces the work carried out by Baggio and Sainaghi (2011). Asian, European, African, American, and Portuguese tourists' experiences in Portugal will have a strong and positive impact on the flow of tourists who will choose to visit the country in the coming years.

Implications

This paper provides a number of theoretical contributions to tourism literature and helps explain the factors that may influence tourist flows. Evidence collected show that tourist arrivals and the demand for tourist accommodation depend on international markets and, more specifically, on the existence of terrorist attacks in other countries. These assumptions confirm the existence of

"Global Consumers" (Hollensen, 2011).

This study clearly demonstrates the existence of the so-called substitution effect caused by terrorism events. Tourists choose destinations perceived as safer instead of places they see as potential terrorist targets, as stated in previous studies (*e.g.* Ahlfeldt et al., 2015; Araña & León, 2008; Bonham et al., 2006; Drakos & Kutan, 2003; Enders et al., 1992; Enders & Sandler, 1991; Gu & Martin, 1992; Neumayer, 2004; Neumayer & Plümper, 2016; Yaya, 2009). Secondly, it was possible to confirm the existence of a one-year consumer short memory effect. The increase in tourist arrivals recorded during a certain year-long period has a direct impact on the increase of tourist arrivals that will occur in the following years. This result may be related with the positive image created by tourists' word of mouth or through the repetition effect. However, a longer, two-year memory effect shows different results. Tourist arrivals from Portugal, Europe, Africa, and America in a two-year lag reveal an opposite impact on the arrival of tourists in Portuguese destinations, confirming the findings of the study conducted by Enders and Sandler (1991). This study also contributes to add information to the existing literature that analyzes the effect of terrorist attacks on tourist arrivals according to their geographical origin.

The results unveiled by this study allow public and private tourism organizations to create new predictive models or to update those already in motion, by adding new variables to improve their efficiency and increase the knowledge needed to understand and anticipate international tourist behaviors, specifically those that are related with the existence of terrorist attacks in other European regions.

Moreover, using the theoretical background provided by this paper, it was possible to create an index - Tour-Terror - that allows managers to observe the potential impacts of attacks perpetrated in a given region on the economy of recipient countries and that will lead to an increase or to a decrease in tourist arrivals. Those fluctuations are related with the tourists' characteristics such as their cultural, social, and economic origin. These features may differ from the residents' usual standards but also from those of the average tourist who usually visits the country. Accordingly, the Tour-Terror index determinants of a country may include independent variables like: i) the level of change in tourism demand and supply due to terrorist attacks; ii) the tourist price level structure; iii) tourists' purchasing power parity; iv) the duration of the stay; v) tourist accommodation capacity; vi) the capacity of other related facilities; and vii) human labor capacity.

Managers should face the fact that terrorist attacks provoke a substitution effect on destination choice behaviors. Tourists will replace destinations considered unsafe due to terrorist threats with others considered safer. The physical distance of the tourists' home countries and their cultural and socio-economic traits influence this replacement behavior. In addition, managers must take into account that the substitution effect occurs between the European countries located in central areas and those located in peripheral areas. When terrorist attacks occur in the Center of Europe, tourists avoid those regions and choose peripheral destinations like Portugal. Evidence also made it clear that the opposite effect also happens.

Given the randomness of terrorist attacks, tourism managers should be prepared to alter quickly their marketing strategy, namely their market targeting strategies and promotion campaigns to prevent substitution effect. These specific practical implications are particularly important to tourist companies located in Portugal. Tourists from Angola, Brazil, the United States, and Canada have proven to be very profitable since they stay longer and purchase high level and luxury products. For that reason, Portuguese companies should make them their main target.

Limitations and further research

The first limitation refers to the research settings, namely the fact that the study only considers one country and a 15-year time lag. More countries or bigger regions and a longer time lag could improve the analysis. A broader period of analysis could prove the relevance of additional factors like price level, crime rates, accommodation profit, price effect and quantity effect registered in Portugal, among others. A more detailed analysis could use sub-regions or even countries instead of continents for tourist arrivals. Further analysis should study the countries' macro-economic and social-cultural fundamentals to improve the results.

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