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The effect of Terrorism on Tourism: a Panel Data Analysis

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ABSTRACT

This study examines the relationship between domestic and international terrorism and tourism arrivals. By collecting panel data on inbound Tourism Arrivals and Terrorism incidents for 25 countries from 1995 to 2020, we find that fatalities have a negative impact on the growth of arrivals of these countries, as also on the per capita GDP growth. The Dynamic Multiplier Functions have shown that these effects can last for even a year, displaying the importance of safety and stability for a country's economic sector.

Keywords: Tourism Arrivals, Terrorism, Panel Data, VAR model analysis, Empirical Analysis

1. Introduction

The present paper conducts an empirical analysis about the causal links between Terrorism events and the impact these have on Tourism and tourist arrivals generally. Its main purpose is to find out if an act of terrorism that results to fatalities has a negative or no effect at all in the growth of tourism arrivals while also examining the duration of this effect, if it exists. By running a panel Vector Autoregression model we find that fatalities, as an exogenous variable of the model have a negative impact not only on the growth of arrivals, but also on the per capita growth of GDP, while the foreign direct investment stays unaffected. Both effects are shown to have a year-long duration, with the effect on the arrivals growth to be harsher than the effect on the per capita growth of GDP.

It is logical that a terrorist incident has a definitely negative impact on tourist arrivals on the region or country it takes place. Tourism, whether it is internationally inbound or domestically, is a situation that needs peace, safety and stability to the region one comes from as also the region they are travelling to. Examining the way terrorism affects tourism is interesting as the touristic section is considered highly vulnerable to huge losses for economies (Samitas et al., 2018). In general, fear and insecurity are major barriers to international travel (Buckley & Klemm, 1993). Terrorism has grown to be a serious global worry for the touristic business sector, tourists and host communities (Mansfeld & Pizam, 2005). Lately, attacks and incidents that are characterized as "acts of terrorism" have emerged more often. It is important to notice that, terrorist incidents have risen nearly 200% since 2011, while since 2007, the number of terrorist-related deaths and injuries in OECD member states has risen by 900% (IEP 2018). Terrorist attacks can destabilize and severely fracture any country's image, as also affect the areas around the target area that received the attack. The

consequences of such an event, can be devastating for the country's/area's economic sector. The past few years have seen a rise of these incidents globally. These events usually involve internal political issues, even though there have been occurrences involving global geopolitical differences. Even though the attacks' duration is usually short, impact on the touristic sector is in contrast with that. For example, the impact of 9/11 attacks against the Twin Towers in New York, U.S. have affected tourism by establishing more thorough security checks at airports worldwide but also in another point of view. More specifically, international arrivals to the U.S. have decreased by 8.5% in 2001, while it needed three years for the market to recover to equal levels as 2000.[1]

By reviewing such events and their impact, it is easy to understand that for tourism on general, any attack and especially, these of terrorism, can severely affect the arrivals not only for the time period the attack takes place, but for the following seasons too. Safety is one of the most important aspects of life and one that everyone considers before choosing their holiday destination. Thus, it is highly important for any country to have a high level of security and stability in order to provide the best possible conditions so people will choose it as a destination in a single thought. Most of the times, even the perception of insecurity can contribute to travel anxiety that may be even more troublesome than the actual risk (Bassil et al., 2017). However, the exceptionality of the destination may entice a person to tolerate the risk when making a travel choice (Frey et al., 2007). This can be confirmed by the fact that, India, a country that had 450 attacks in 2020 pursuant to the Global Terrorism Database, also had received 6.3 million tourists pursuant to the UNWTO[2].

In a more general point of view, according to the World Travel & Tourism Council, the industry of Tourism is accountable for 7.6% of the global GDP in 2022, which is 22% of an increase compared to 2021. There was also an increase of 7.9% of new jobs as also international visitor spending rose by 81.9% in 2022 compared to the previous year, showing the vitality of the countries to provide security and stability globally, as the consequences of events that would trigger failure in the Tourism and Travel sector could be catastrophic on a global scale[3].

1.1. Definition of Terrorism

Terrorism is defined in various ways throughout the existing literature. According to Agnew (2010), it is described as "the commission of criminal acts, usually violent, that target civilians or violate the laws of war when they target military personnel, and that are done at least in part for social, political or religious ends" (Agnew, 2010). The deliberate use of violence or the threat of violence by individuals or subnational groups

[1] Source : *World Bank Open Data*. (n.d.). World Bank Open Data. https://data.worldbank.org

[2] Source : *Tourism Statistics Database*. (n.d.). Tourism Statistics Database. https://www.unwto.org/tourism-statistics/tourism-statistics-database

[3] Source : *Travel & Tourism Economic Impact | World Travel & Tourism Council (WTTC)*. (n.d.). Travel & Tourism Economic Impact | World Travel & Tourism Council (WTTC). https://wttc.org/research/economic-impact

to achieve a political or social target by intimidating a sizeable audience in addition to the immediate victim is defined as terrorism according to Sandler & Enders (Sandler & Enders, 2008). “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” is the definition that the Global Terrorism Database was based on, in order to collect over 200.000 terrorism events globally.

In 1996, Lord Lloyd proposed to UK, via his Inquiry into Legislation against Terrorism report, the definition that states terrorism as the use of serious violence against persons or property, or the threat to use such violence, to intimidate or coerce a government, the public or any section of it in order to promote political, social or ideological objectives (Greene, 2017). Regarding the Arab Convention for the Suppression of Terrorism (1998), defined terrorism as “any act or threat of violence, whatever its motives or purposes, that occurs in the advancement of an individual or collective criminal agenda and seeking to sow panic among people causing fear by harming them. or placing their lives, liberty or security in danger, or seeking to cause damage to the environment or to public or private installations or property or to occupying or seizing them, or seeking to jeopardize national resources.

In addition, the United Nations’ Security Council Resolution 1566 (2004), defines terrorism as “Criminal acts, including against civillians, commited with the intent to cause death or serious bodily injury, or taking of hostages, with the purpose to provoke a state of terror in the general public or in a group of persons, or particular persons, to intimidate a population or compel a government or international organization to do or abstain from doing any act” (Council (59th year : 2004), n.d.). On the same time, the European Union defines terrorism in Art.1 of the Framework Decision on Combating Terrorism (2002), as “offences that given their nature or context, may seriously damage a country or international organization where commited with the aim of : seriously intimidating a population; or unduly compelling a Government or international organization to perform or abstain from performing any act; or seriously destabilizing or destroying the fundamental political, constitutional, economic or social structures of a country or an international organization” (*EUR-Lex - 32002F0475 - EN - EUR-Lex*, n.d.).

While many definitions of terrorism exist, as there is not one common definition across the globe, the author refers to the matter using the definition of the Global Terrorism Database for the next steps of this research.

1.2. Definitions of Tourism

Although Tourism, does have one main definition that is used almost globally, it is its nature that allows the existence of branches that each have their own definition. In detail, tourism is defined as a social, cultural, and economic phenomenon which entails the movement of people to countries or places outside their usual environment for personal or business/professional purposes. These people are called visitors (they may

be even tourists or excursionists; residents or non-residents) and tourism has to do with their activities, some of which involve tourism expenditure.[4]

According to the Britannica Encyclopaedia, tourism is the act and process of spending time away from home in pursuit of recreation, relaxation, and pleasure, while making use of the commercial provision of services (*Tourism | Definition, History, Types, Importance, & Industry*, n.d.).

As tourism is a really vague matter, the United Nations World Tourism Organization (UNWTO) has created a glossary full of definitions for all its branches. Moreover there exist detailed definitions regarding "Adventure Tourism", "Business Tourism", "Coastal tourism" etc.[5]

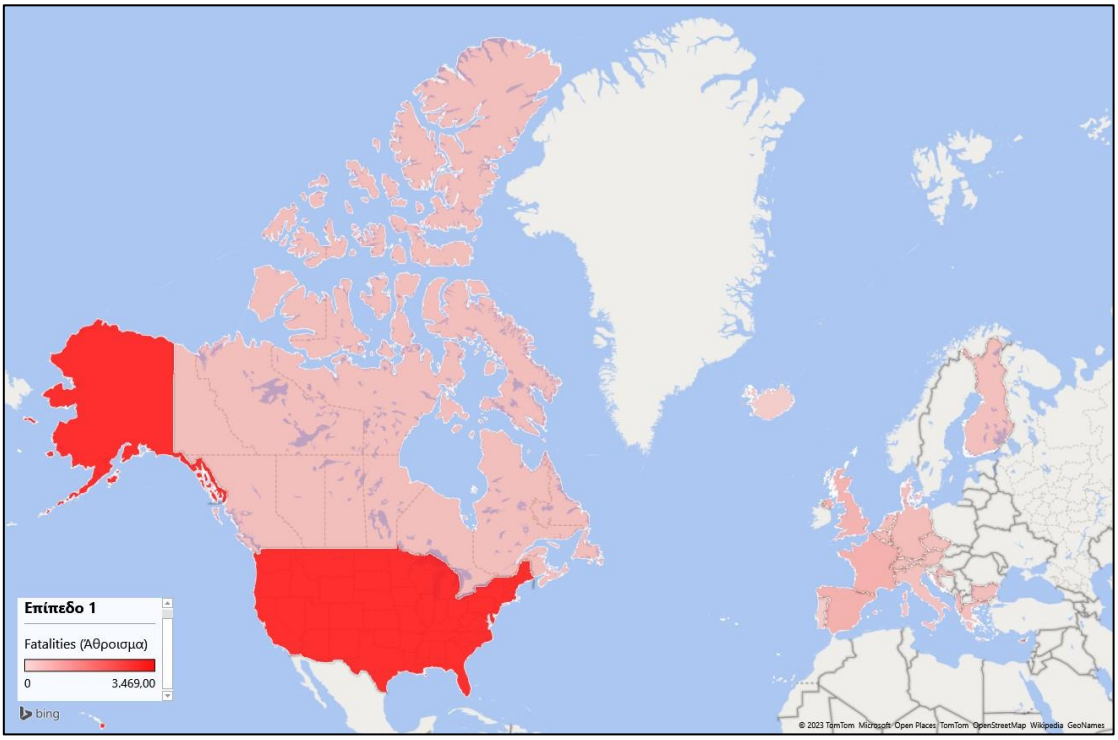


Figure 1 Heatmap of fatalities in the areas of interest

2. Literature Review

Within the context of international security and economic growth, the interaction between terrorism and tourism has become a crucial area of research and investigation. In this chapter, we present a review of some of the existing literature, in an effort to explore the methods other researchers used in order to better understand these two fields

[4] Source : *Glossary of tourism terms | UNWTO*. (n.d.). Glossary of Tourism Terms | UNWTO. https://www.unwto.org/glossary-tourism-terms.

[5] On the present heatmap, the higher the total number of fatalities a country had throughout the years of interest, the darker the color on its area

and their interrelations as also to help the reader adjust to the following parts of the present research.

Fauzel & Seetanah (2023) have tried to study the relationship between the two sectors on a sample of African countries over the period 1995 to 2017. Their research proved that terrorism has a negative effect on tourism by using a Panel Vector Error Correction Model (PVECM) as also the fact that, the two have a bi-directional causality, indicating that the rise in tourism may result to a rise in terrorist attacks too (Fauzel & Seetanah, 2023). Fletcher & Morakabati (2008) on their study, examined how political upheaval and acts of terrorism affected the level of tourism in Kenya and Fiji, two Commonwealth, developing nations. The nature of the attacks was investigated, as well as how they affected the case studies, in terms of how many tourists eventually travelled to the destination and how much revenue was created. Their findings do point out the fact that low to medium-intensity, one-off terrorist attacks have much less of an influence on the level of tourism than political events such as a coup or harsh political conflicts (Fletcher & Morakabati, 2008).

Bassil et al. (2017), in their work "Terrorism and tourism demand: a case study of Lebanon, Turkey and Israel" examined the effect of terrorism on the tourism demand of Lebanon, Turkey and Israel by using a seemingly unrelated regression (SUR) model. Their study takes into account the intensity of a terrorism incident as well as its spillover effects. By doing so, they discovered that terrorism in one country has an impact on travelers arriving in other countries as well. It was seen that visitors think of Turkish and Lebanese tourism markets as substitutes. Tourism arrivals in these two countries seem to be impacted by terrorism in Israel, regardless of its form (Bassil et al., 2017).

Santamaria (2021), examined the impact of terrorism on tourist arrivals by using an unbalanced dataset via an Ordinary Least Squares estimation with fixed effects. The findings proceed to the implication that the frequency of terrorist acts has a detrimental impact on tourism. They also assessed the impact that a terrorist strike has on non-affected areas that are both inside and outside of the directly affected regions. Finally, it is shown that in countries where terrorist attacks are observed more frequently, there is a certain amount of military expenditure as a percentage of GDP above which tourism statistics tend to rise (Santamaría, 2021). In the work of Samitas et al. (2018), the impact of terrorism on tourism demand in Greece in a monthly dataset from 1977 to 2012 is examined. The authors investigate whether this relationship is bidirectional, as also the lifespan of the effect, if there is one. The results support the notion that terrorism significantly reduces the number of tourists in Greece, and that this causal relationship is uni-directional, only from terrorism to tourism. They also imply that as a response to terrorist occurrences, authorities should set up strict counterterrorism measures and take additional steps to promote tourism, safety and security. The innovation of their work is the use of a three-factor proxy with qualitative features to analyze terrorism (Samitas et al., 2018).

Habibi (2016) examined the determinants of inbound tourism to Malaysia by using a panel data analysis. Their work confirmed that political stability is one of a handful of variables to have a significantly positive effect to inbound tourism for Malaysia, by using a GMM estimation on a panel dataset for visitors to Malaysia from 33 countries over the period 2000-2012. Additionally, Liu & Pratt (2017) assessed tourism's vulnerability and resilience to a terrorism incident. More specifically, their

research uses models of global tourist demand to quantify the link between terrorism and tourism in 95 different nations and territories. After adjusting for income, they find that terrorism has no long-term impact on demand for foreign travel, and that its short-term impact is relatively constrained when viewed globally using panel data models. Only 9 of the 95 nations show a long-term impact of terrorism on tourism, while 25 of the 95 countries show a short-term impact, suggesting that terrorism has little effect on global tourism. The impact varies in places with diverse levels of political instability, wealth and tourism activity (Liu & Pratt, 2017).

In a rather different approach than the rest of the existing literature, Corbet et al., (2019) evaluate the impact of terrorist attacks on European tourism using the airline industry's and passengers' short term post-hoc response. To conduct their research, they used a seasonally adjusted ARMA-GARCH model that provided the availability of examining altercations in tourism, by measuring ASKs, seats filled and changes in fares and revenues. Their findings showed that a given terrorist incident results to the reduction of seat capacity offered by airline companies in four out of twelve total locations for a thirty day period after the attack. Another interesting finding of their research is the fact that, regarding passenger demand (seats sold), of the twelve attacked locations studied, there was a decline on demand in seven locations from 1% to 10%. Finally, their work proved that after such an act, aviation enterprises reduce their fares for travelling to an impacted destination by even 22%, although they did not achieve to avoid a rather significant reduction of revenues for eleven of twelve locations of interest (Corbet et al., 2019).

Another example on examining the relation between Tourism and Terrorism is given by Pizam & Smith (2000) in their work titled "Tourism and Terrorism: a quantitative analysis of major terrorist acts and their impact on tourism destinations". According to their survey, a sizable number of terrorist acts (79%) resulted in a considerable decline in tourism demand that persisted for one to six months before recovering to normal standards in around half of those instances in three months or less. They also discovered that in the approximately 6% of situations where the analysis revealed that the negative influence on tourist demand lasted for 7-12 or longer months, the delayed effects of a reduction in demand that occurred as much as six months after the attacks may have been documented (Pizam & Smith, 2000).

Also, Saha & Yap (2013) in a session of their research, estimated the effects of political instability and terrorism on tourism arrivals or tourism revenue by using a fixed effects model for 139 countries for the period 1999-2009 while testing for different levels of terrorism in a scale of 1-10. The results suggest that political instability has a significantly reductive effect on tourism for any given level of terrorism. However, the higher the terrorism level, the stronger the reduction of tourism revenue. In addition it was discovered that, terrorism increases tourism revenue at the very low to moderate level of political stability and after a threshold level it reduces tourism revenue drastically. Finally the study concludes by advising countries that largely rely on the tourist sector to preserve political stability in order to gain from the desire for travel (Saha & Yap, 2013).

3. Data

In order to collect the necessary data, it is essential to clarify which countries' terrorism incidents and tourism arrivals were going to be taken into account. In order for the analysis to be accurate we picked countries from the Western World but also countries that over the last years, show an important rise on their touristic sector. Particularly, the countries chosen are : Albania, Austria, Belgium, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States of America. The thought process behind the choices was that, data of countries of political stability and developed or developing tourism should be chosen instead of data of countries that may have too many terrorism incidents as also lack stability, affecting the data in a negative way, providing a biased result through the heterogeneity of the information collected.

The data about each country's inbound tourism were collected from the United Nations World Tourism Organization's website. More specifically, the file provided data about : arrivals, arrivals by region, arrivals by main purpose, arrivals by mode of transport, accommodation, tourism expenditure in the country, as far as inbound tourism is concerned. As the purpose is to analyze the total amount of tourism and the effects of terrorism on this country, we summed the number of arrivals from the file's "Inbound Tourism" section. In detail, inbound tourism arrivals refer to yearly frequency, spanning from 1995 to 2020 for each of the countries chosen. The data about Terrorism incidents were initially collected from the Global Terrorism Database's website[6]. The GTD is an open-source database that provides information on terrorist events globally. It includes both domestic and international incidents, counting a number of 200,000 cases in its database. After downloading all of the incidents for each of the countries of interest, and for the time period of interest, we merged the data in order to reform them to an annual frequency, as the database provides the information in a daily frequency.

To be able to construct a well specified panel VAR model that would provide reliable and robust results, we added two more variables as endogenous to the growth of arrivals; GDP (per capita gross domestic product growth) and FDI (foreign direct investment). This way, the effect of fatalities from terrorism incidents as an exogenous variable on the endogenous variables can be assessed. To collect the data of variables per capita GDP growth and FDI, we visited the website of World Bank Open Data and downloaded the respective data for the countries of interest.

3.1. Descriptive statistics

In this section we provide the descriptive statistics tables of the dataset. Each column of the table refers to one of the variables of interests, namely : growth of arrivals (AGR), per capita growth of GDP (GDP), foreign direct investment (FDI) and the fatalities of a terrorism incident (FAT). At first, the descriptive statistics of the growth of arrivals

[6] Source : *Global Terrorism Database*. (n.d.). Global Terrorism Database. https://www.start.umd.edu/gtd/

is displayed on the first column. It is observed that the average of the growth of all the countries on the dataset is positive, meaning that tourism on that period was on the rise. Another interesting feature of the table is the minimum and maximum points of the variable. More specifically, the lowest growth was observed in Cyprus for the year 2020 while the highest value of the variable was observed in Denmark, where in year 2003 their growth of tourism arrivals rose by 514%. In more detail, while Denmark's tourist arrivals in 2002 were 3,436 people, in 2003 21,119 people visited the country. The total amount of observations is referred as "Count", which represents the observations per country (25 countries for 25 years)[7].

Other valuable information that can be derived from the table is the distribution of the data. Particularly, by noticing the value of Kurtosis (98.39), it is safe to state that the data has a sharper and more peaked distribution compared to the normal distribution. This phenomenon is called leptokurtosis. This means that there are more extreme values in the data. As for the asymmetry of the distribution, by controlling the Skewness provided in Table 1, we see that the data about the growth of arrivals has a positive skewness, indicating that the majority of data points are on the left side of the distribution. While the Skewness is greater than 1, it is said that the distribution is highly skewed.

	AGR	***GDP***	***FDI***	***FAT***
Average	3.498	1.481	2.154	7.571
Standard error	1.372	0.129	0.196	4.847
Median	3.074	1.699	0.620	0.000
Variance	1176.973	10.362	24.148	14688.825
Kurtosis	98.397	4.270	13.330	609.661
Skewness	7.499	-0.771	0.962	24.551
Min	-84.649	-13.590	-36.680	0.000
Max	514.639	18.912	26.990	3014.000
Sum	2186.867	925.963	1346.500	4732.000
Count	625	625	625	625
Confidence level(95.0%)	2.694	0.252	0.386	9.520

Table 1 Table of Descriptive Statistics[8]

The second column shows the information about the next endogenous variable of the model, the growth of the per capita GDP. As in the case of the growth of arrivals, its average is also positive, meaning that there is a positive growth on the economies of the countries of interest for the yearspan examined. The lowest value (-13.590%) is observed in Bulgaria in 1997, while the highest value (18.912%) belongs to Malta in 2000. The data about Kurtosis (4.270), provide the argument that the distribution is very close to the normal distribution, being slightly positive though, meaning that it has heavier tails and more extreme values. While checking for Skewness, it is safe to say

[7] The number of arrivals is in thousands

[8] For the economy of space, the variable "growth of arrivals" is denoted as AGR, "per capita growth of GDP" is denoted as GDP, "foreign direct investment" is denoted as FDI and finally "fatalities" is denoted as FAT.

that for the per capita growth of GDP the distribution slightly skewed and negative, indicating more data points on the right side of it.

Regarding the foreign direct investment index, the descriptive statistics table shows that the average value of the index is 2.154%. This makes sense as most of the countries with a higher index are not included on this research (China, Hong Kong, Singapore etc). The latter reflects the fact that on the countries of interest, the equity flows in their economies come from residents of the respective countries and not from residents from abroad. Another interesting point among others, is the minimum observation (-36.680%) that is found in Netherlands in 2018 as also the maximum, observed in the United States in 1998 (26.990%). As for the asymmetry and peakedness or flatness of the distribution, by noticing the values on Skewness and Kurtosis respectively, one can say that the dataset of FDI follows a positively skewed and leptokurtic distribution (Skewness = 0.962 and Kurtosis = 13.330).

Finally, on Table 1, we also display the descriptive statistics of the exogenous variable of the model. Fatalities, as referred above, represents the fatalities produced out of a terrorist event in a country of the 25 examined, from 1995 to 2020. It is important to notice that in these 25 years of interest, 7.5 people died on average out of a terrorist incident. Moreover, 4732 people died totally out of all the observed incidents while the deadliest of all the attacks, resulted to the death of 3014 people. This incident was no other than the 9/11 Twin Towers attack in the United States in 2001. It is by far the deadliest of the events examined in this research, as the second deadliest had 193 fatalities (Madrid, 2004) and the third counted 162 fatalities (France, 2015). Last but not least, it is observed that the dataset of fatalities provides the more extreme values of Skewness and Kurtosis between the variables. In detail, the distribution is highly asymmetric to the left as Skewness is positive (24.551) while also leptokurtic, as Kurtosis is highly positive (609.661), meaning it has a sharper and more peaked distribution than the normal distribution.

4. Methodology

4.1. Stationarity tests

Before creating a panel VAR model, one needs to test about the existence of unit roots in their variables. The components of the vector should all be stationary in order to run a Panel Vector Autoregression (Panel VAR) model. To guarantee the accuracy and dependability of the results, stationarity is a crucial presumption in time series analysis.

Stationarity in a model's variables means that its statistical characteristics, such as mean, variance and autocorrelation, remain constant over time. If the series is non-stationary, it can lead to spurious regression findings and inaccurate inferences. In this research, all of the variables, endogenous or exogenous, proved to be stationary in the majority of the stationarity tests that were conducted. More specifically, these tests were the following :

At first, there is the Levin Lin Chu unit root test. This test was created to resolve some of the limitations of existing unit root tests. It was specifically created for panel data from its designers, Jeffrey Levin, Chien-Fu Lin and Chia-Shang James Chu. The test seeks to compare the alternative hypothesis of stationarity with the null hypothesis of a unit root existence by pooling the cross-sectional data. In other words, it aims in determining whether each cross-sectional unit's time series is stationary or has a unit root.

When working on a panel data with large time series dimension, pooling a portion of an individual time series of a large panel can be advantageous in handling more general patterns of correlation (Park et al., 1990). On the contrary, if the time series dimension of the panel is small and the cross-sectional part is large, then the existing procedures will be appropriate (Breitung & Meyer, 1994). However, industry-level or cross-country econometric studies usually use panels of a moderate size. The unit root test procedures of Levin Lin Chu are especially helpful for studies with panels of that size because typical multivariate time series and panel data procedures may not be computationally feasible or powerful enough for panels of this size (Levin et al., 2002).

In detail, the LLC test consists of 3 steps. Step 1 is to perform ADF regressions for each individual cross-section part and generate orthogonalized residuals. By using the method proposed by Hall (1994) the test checks for selecting the appropriate lag order. In step 2, the LLC test estimates the ratio of long-run to short-run standard deviations under the null hypothesis of a unit root. In step 3, the panel test statistics is computed. More specifically, by pooling all cross sectional and time series observations the error is estimated, based on the average number of observations per individual in the panel as also on the average lag order for the individual ADF regressions. Eventually, the adjusted *t*-statistic is calculated (Levin et al., 2002).

The second test, is the Harris-Tzavalis panel unit root test. This unit root test is designed for panel data aiming to address the issue of cross-sectional dependence. The test was proposed by David Harris and Elias Tzavalis in their paper titled "Inference for Unit Roots in Dynamic Panels Where the Time Dimension Is Fixed" (Harris & Tzavalis, 1999). It is intended to work with panel data when the time dimension of the panel (T) is fixed, and the number of cross-sectional units is large (N). This case is typical in the fields of economics and social sciences, where researchers frequently examine data involving numerous entities observed over a predetermined amount of time. Its main goal is to offer a robust unit root testing method that takes into account both serial correlation within time series and cross-sectional dependence. If not properly considered, this cross-sectional dependence may result in spurious findings, as the independence assumption often made by conventional unit root testing does not always hold.

In particular, the HT test performs individual unit root tests to each individual time series within the panel and then calculates the cross-sectional averages of the *t*-statistics obtained from these unit root tests. Then, a test statistic is created, that takes into consideration the cross-sectional dependence by taking into account the average of the individual test statistics performed earlier. Following these steps, by using simulations, the HT test determines the test statistic's critical values and then compares them to with the test statistics derived in the earlier stages of the test. If the test statistic is more extreme than the critical value, the null hypothesis of a unit root can be rejected.

In conclusion, Harris and Tzavalis introduced a unit root test for first order autoregressive panel data models where the time dimension of the panel is fixed, allowing for fixed effects and individual deterministic trends. The tests are based on the LS estimator of the autoregressive coefficient that has been normalized and when necessary, corrected for consistency issues. It is also demonstrated that the tests' limiting distributions are normal. In additions, the tests against local alternatives are found to have significantly greater power performance than the single time series Dickey-Fuller tests, and their performance rises monotonically with both T and N (Harris & Tzavalis, 1999).

The third test is the Breitung panel unit root test, that, Jorg Breitung suggested in his paper "The Local Power of Some Unit Root Tests for Panel Data" (2000) which is very similar to the unit root test proposed by Harris-Tzavalis. It provides another way to test for cross-sectional dependence in a panel data analysis. More specifically, it performs individual unit root tests (often the augmented Dickey-Fuller test) to each time series within the panel, in order to calculate cross-sectional averages. It then creates the test statistics based on these averages, considering for cross-sectional dependence. Its next step is to determine critical values, in order to compare them with the test-statistics and provide the researcher with the verdict of rejecting or failing to reject, the null hypothesis of a unit root existence (Breitung, n.d.).

As stated before, the Breitung test and the Harris-Tzavalis test seem to be identical. Their main difference though, is how they handle cross-sectional dependence. The Harris-Tzavalis test in particular, is designed to address both heterogeneity and cross-sectional dependence on the same time, while the Breitung panel unit root test does not absolutely account for cross-sectional dependence.

The next one is the Hadri panel unit root test, proposed by Kaddour Hadri in his paper "Testing for stationarity in heterogeneous panel data" (1999) (Hadri, 2000). It is a residual-based Lagrange multiplier test for the null hypothesis stating that the series are stationary around a deterministic level or trend, against the alternative of a unit root in panel data. It seeks to take into account cross-sectional dependence as also the potential for heterogeneity between individual units in the panel. It is designed to handle circumstances where each panel unit displays a different trend or dynamic, as it also permits the existence of cross-sectional correlation and individual-specific deterministic components such as trend or intercepts.

In a brief overview, the Hadri test estimates regressions of each individual unit in the panel, including a constant and a linear time trend. Then, it calculates the residuals of those regressions, in order to apply the Augmented Dickey-Fuller test to each of these residual series. After the average test statistics are calculated, the basis of the Hadri is formed and eventually its critical values are determined. It then provides the ability to compare the Hadri test statistic to the critical values, resulting to rejecting or not the null hypothesis of a unit root existence within the panel.

Another test conducted is the Im Pesaran Shin test. The IPS test is based on the following model from Levin and Lin (Maddala & Wu, 1999):

$$\Delta \mathbf{y}_{i,t} = \boldsymbol{\rho} \mathbf{y}_{i,t-1} + \boldsymbol{\alpha}_i + \boldsymbol{\varepsilon}_i \text{ where } \mathbf{H}_0 : \boldsymbol{\rho} = \mathbf{0}, \boldsymbol{\alpha}_i = \mathbf{0} \text{ for all i}$$

In general, the IPS test has many similarities with the Levin Lin test (as it is based on one of its models). In essence, it is a model where each of the N cross-section units has a linear trend. Therefore, individual unit roots are conducted for the N cross-section units, where the *t*-test for each unit is based on T observations. The test is often referred as a generalization of the Levin Lin test, however it is highly important to note that the IPS test is a method of combining the evidence on the unit root hypothesis from the N unit root tests conducted (Maddala & Wu, 1999).

In a brief explanation, the test works through 5 different steps. At first it estimates a regression for each individual unit of the panel. In the next step, it captures cross-sectional mean and variance and after that it calculates the IPS test statistic by dividing the mean by the standard deviation, derived from the previous step. Before proceeding to the last step, it obtains the critical values for the test statistic and lastly, it compares the IPS test statistics to the critical values. If the test statistic exceeds the critical value, the null hypothesis of a unit root existence is rejected. In general, the IPS test offers a robust way to test for unit roots in a panel dataset when heterogeneity and interdependencies are anticipated between the various units of the dataset.

The final test conducted is the Fisher panel unit root test, or Fisher-type combination test is a procedure developed by Fisher (1932), that depends on combining the observed significance levels from different tests (Maddala & Wu, 1999). It is a highly recommended test as it is based on the sum of the log-*p*-values, making it the most powerful combination test amongst the *p*-value combination tests (Becker, 1997). In general, the Fisher test, which is directly comparable to the IPS test, is a method of combining information from various tests to create a single test statistic. To achieve that, it performs individual unit root tests, calculates the test statistic of these tests and then combines this information to create an aggregated test statistic. It then determines the critical values for the Fisher combination tests and makes inferences, rejecting or not the null hypothesis of a unit root existence.

4.2. Panel Vector Autoregression model

After controlling for unit roots, it is time to proceed to the estimation of a first-order Panel Var model with fixed effects. Its mathematical implementation is shown in Eq. (1) : [9]

$$\mathbf{y}_{i,t} = \mathbf{A}_1\mathbf{y}_{i,t-1} + \mathbf{F}_1\mathbf{z}_{i,t} + \mathbf{u}_i + \boldsymbol{\varepsilon}_{i,t}\,, \quad (1)$$

where i denotes the countries in the dataset ($i \in \{1,\ldots,25\}$), t refers to the time period of the data ($t \in \{1996,\ldots,2020\}$), $\mathbf{y}_{i,t}$ is a (1×3) vector of endogenous variables; the growth of arrivals for each country denoted as AGR, the foreign direct investment denoted as FDI, as also the per capita growth of Gross Domestic Product denoted as GDP. $\mathbf{z}$ denotes the exogenous variable fatalities, which comes of the fatalities produced from terrorist events. $\mathbf{A}_1$ is a (2×3) coefficient matrix and $\mathbf{F}_1$ is a (1×3) coefficient matrix. Finally, $\mathbf{u}_i$ is a (1×3) vector of panel fixed effects and $\boldsymbol{\varepsilon}_{i,t}$ is a (1×3) vector representing the error term.

[9] It shall be noted that the following model's specification was estimated after running lag length criteria test in order to choose the correct lag length of the model

4.3. Lag Length Criteria test

In order to test the Panel Var's specification, a Lag Length Criteria test was conducted, to show the appropriate lag length of the model. The test provides a table with measurements regarding the Akaike Information Criterion, the Bayesian Information Criterion and the Hannan-Quinn Information Criterion. The model with the optimal specification of lags, is the one with the lowest values on the information criteria. It is noted that one can choose their model specification, either regarding one of the information criteria or by choosing the lag length that has the lowest value on more than one of the criteria.

The information criteria of AIC, BIC and HQIC are all measures of good fit of the model and complexity. They measure if a model fits well, but propose a penalty when too many parameters are included in the model. They all try to find the balance between complexity and good fit, but use different penalty terms. It is noted that in all three of the criteria, the lowest the value of measurement is, the better the model specification.

4.4. Stability Diagnostics

After constructing the proper model specification regarding the lag length criteria, the stability of it shall be examined in order to ensure of the validity of it, as also to cement that the conclusions drawn by it, as also possible forecasts would be valid and reliable.

To do so, a stability diagnostics test has been conducted. By using the "*pvarstable"* command in Stata, the user is allowed to check the stability condition of panel VAR estimates by calculating the modulus of each eigenvalue of the fitted model. Both Hamilton (1994) and Lutkepohl (2005) demonstrate that a VAR model is stable if all of the companion matrix's moduli are strictly less than one. According to the term of stability, the panel VAR if stable, is invertible and has an infinite order Vector Moving Average representation, giving estimated Impulse Response Functions and Forecast Error Variance Decompositions a known interpretation (Abrigo & Love, 2016).

4.5. Granger Causality test

Granger causality, is a statistical concept named after Clive Granger, which allows a researcher to tell whether a time series may predict another time series (*The Journal of Philosophical Economics*, n.d.). It is widely used in time series analysis and econometrics to examine the causal links between variables. As defined by Clive Granger, " a time series variable A causes B, if the probability of B conditional on its own past history and the past history of A does not equal the probability of B conditional on its own past history alone " (Granger, 1969).

In plain words, the test focuses on temporal relationship between two time series and involves Wald tests to examine whether the coefficients associated with lagged values of one variable are jointly significant in predicting the other variable. The null hypothesis of the test states that, past observations of variable A do not have any predictive power for variable B. The test's mathematical implementation is based on linear regression modeling of stochastic processes (Granger, 1969).

4.6. Dynamic Multiplier Impulse Response Function

In order to derive the response of the endogenous variables, to a shock of the exogenous variable, we use the Dynamic Multiplier extension of Impulse Response Function. This allows us to examine the effect of a shock on fatalities to the growth of arrivals, foreign direct investment and the per capita growth of Gross Domestic Product in a 4-step ahead period. By using the dynamic multiplier method, a user is able to extend the concept of an impulse response function as it considers the interactions, modifications and feedback loops that take place in the system throughout time. This provides a clearer picture of how shocks influence the entire system of variables and how these effects might change as the system responses to the shock. It shall be noted, that this method relies on the default impulse response function of Stata 17, based on the Cholesky decomposition while the response of the endogenous variables is derived from the calculations of the dynamic multiplier at each period. In addition, to estimate the confidence bands, the method uses a Gaussian approximation based on Monte Carlo draws from the fitted panel VAR model (Abrigo & Love, 2016).

In the next sections of this paper the results of all tests and calculations conducted on the panel VAR is displayed, as also the interpretations of each test and the conclusions.

5. Results

5.1. Growth of arrivals unit root tests results

The results from the unit root tests conducted on the growth of arrivals variable, confirm the theory that a variable in the form of "growth" is stationary. The only test stating the opposite is the LLC test, where the results fail to reject the null hypothesis of a unit root existence in the panel.

The null hypotheses of 3 out of 6 of the unit root tests state that "Panels contain unit roots" (LLC, HT and Breitung tests) while two state that " ALL panels contain unit roots" (IPS and Fisher tests) and the Hadri test's null hypothesis states that "ALL panels are stationary". By the data acquired from these tests, shown in Table 2 regarding the growth of arrivals for each country in the panel, 5 out of 6 tests conclude that the variable is stationary, hence the stationarity status of AGR is verified. It shall also be noted that the significance level is 95% while there is absence of a time trend.

Variable of interest : AGR		
Unit root tests	***p*-value**	**Stationarity verdict**
Levin-Lin-Chu	1.000	Non-stationary
Harris-Tzavalis	0.000	Stationary
Breitung	0.000	Stationary
Im-Pesaran-Shin	0.006	Stationary
Hadri	0.221	Stationary
Fisher [10]combination test	0.001	Stationary

Table 2 Stationarity tests' results for the growth of arrivals

5.2. Foreign Direct Investment unit root tests results

In the case of the Foreign Direct Investment variable, the results show the existence of stationarity, even though it is not confirmed in all of the unit root tests conducted. Specifically, the Hadri test's results reject the null hypothesis that, all panels are stationary, failing to confirm the stationarity status of the variable. On the other hand, the rest 5 out of 6 total unit roots state that the variable is stationary, and hence, we proceed with the majority verdict.

Variable of interest : FDI		
Unit root tests	***p*-value**	**Stationarity verdict**
Levin-Lin-Chu	0.001	Stationary
Harris-Tzavalis	0.000	Stationary
Breitung	0.000	Stationary
Im-Pesaran-Shin	0.000	Stationary
Hadri	0.000	Non-stationary
Fisher combination test	0.001	Stationary

Table 3 Stationarity tests' results for the foreign direct investment

[10] On Fisher's combination test, the user takes into account the Inverse chi-squared test statistic, while the test is run with 2 lags in the ADF tests it conducts

5.3. Per capita growth of GDP unit root tests' results

The case of the per-capita growth of GDP is different than the previous variables tested. In the latter, 2 out of 6 tests result that the variable is not stationary. More specifically, according to the Hadri test, some panels regarding the variable contain unit roots while according to the Fisher combination test all panels contain unit roots. In contrary, the rest 4 out of 6 tests suggest that the variable is stationary, providing the researcher with the assumption of stationarity, since the strong majority of the tests suggest that the per-capita growth of the GDP of the panel is stationary.

Variable of interest : GDP		
Unit root tests	***p*-value**	**Stationarity verdict**
Levin-Lin-Chu	0.036	Stationary
Harris-Tzavalis	0.000	Stationary
Breitung	0.000	Stationary
Im-Pesaran-Shin	0.000	Stationary
Hadri	0.000	Non-stationary
Fisher combination test	0.054	Non-stationary

Table 4 Stationarity test's results for the per-capita growth of GDP

5.4. Fatalities unit root tests results

In the case of the exogenous variable of the panel-VAR, fatalities, all of the unit root test agree of the variable's stationarity, as seen in Table 5. Fatalities, is the variable denoting the fatalities produced from the terrorist incidents. Thus, it is a crucial importance variable for the continuation of this research, as it is the lever that alters the behavior of the endogenous variables. This means that it is absolutely necessary for this variable to be stationary, which the results showed it is, in order to continue this research.

Since all of the variables of interest solidified the stationarity status through the unit root tests, the construction of a panel Vector Autoregression Model is feasible. Stationary vector components validate the reliability of the results. For example, if a time series is non-stationary, it can lead to spurious regression results.

Variable of interest : FAT		
Unit root tests	***p*-value**	**Stationarity verdict**
Levin-Lin-Chu	0.000	Stationary
Harris-Tzavalis	0.000	Stationary
Breitung	0.000	Stationary
Hadri	0.841	Stationary
Fisher combination test	0.000	Stationary

Table 5 Stationarity test's results for the fatalities variable[11]

5.5. Panel Var model estimation

In order to examine the effect of terrorism to tourism across the panel dataset, we constructed a panel Var model where the growth of arrivals, foreign direct investment and per capita growth of GDP are the endogenous variables, and the fatalities produced out of a terrorism incident is the exogenous variable of the model.

As a first step, a random specification panel Var was created, with the inclusion of variables as stated as above, but with the addition of two (2) lags of each of the endogenous variables. The estimation was based on the Generalized Method of Moments, containing 550 observation within 25 panels. In order to check if this model is the optimal, and then further analyze it, we conduct a lag length criteria test, the results of which are shown in Table 6.

Lag	CD	J	J *p*-value	MBIC	MAIC	MQIC
1	.565	42.445	.580	-232.470*	-47.554*	-120.436*
2	.659	38.567	.354	-181.364	-33.432	-91.737
3	.657	30.664	.285	-134.285	-23.335	-67.065
4	.424	20.786	.290	-89.179	-15.213	-44.366

Table 6 Lag length criteria test results[12]

The findings of the test showcase that the optimal specification for the model would include one (1) lag of the endogenous variables instead of two (2). The optimal lag length is denoted by the point where the Akaike, Bayesian and Hannan-Quinn information criteria have their lowest value. In this case, all three of the criteria result on the optimal specification of one lag in the model.

After clarifying the optimal lag length point of the model, we re-estimated the model, using the suggested number of lags. The results, shown in Table 7, provide

[11] The IPS unit root test is excluded for the variable of fatalities as it failed to show any results of stationarity or non-stationarity

[12] The star notation (*) denotes the lowest value of the respective criterion

various and important information. At first, it is important to analyze the *p*-values of the variables concerning each endogenous variable at a time, in order to check for the statistical significance of each variable. In the case of the growth of arrivals as a dependent variable, one can see that all of the variables are statistically significant, at least for a level of significance of 10%. This means that all of the involved variables have an actual effect on the growth of arrivals. Whether this effect is positive or negative, is defined from the sign of the coefficient of each variable.

By further analyzing the model's results, one can see that the growth of arrivals of a country is affected positively by last year's growth of arrivals, the per capita growth of GDP as also the foreign direct investment, while it is negatively affected by the fatalities of a terrorism incident, as expected. All of these results confirm the theory behind these variables and provide further information for their interconnections. For example, if the connection between the Gross Domestic Product and the touristic sector of a country was already widely known, it sheds some light to how the foreign investment equity flows in the reporting economy affect the touristic sector of the respective country.

Moving on to the next endogenous variable, per capita GDP growth, it is observed that once again, all of the variables used by the model as independent, are statistically significant, for a significance level of 5% and 10%. In detail, all of the variables except the growth of arrivals are strongly significant even for a 1% level of significance. Generally, the independent variables of the model, affect the dependent as expected by theory – only the fatalities of a terrorism incident have a negative coefficient, meaning a negative effect to the per capita growth of GDP of a country.

In the case of the Foreign Direct Investment as a dependent variable, the situation is slightly different. This time, it is noticed that the growth of arrivals and the fatalities of a terrorism event, are not statistically significant; hence, do not have any effect on the foreign direct investment. In contrary, the variable's lag and the per capita growth of GDP are both statistically significant even for 5% level of significance, while both have positive coefficients, proving to have a positive effect to the dependent variable.

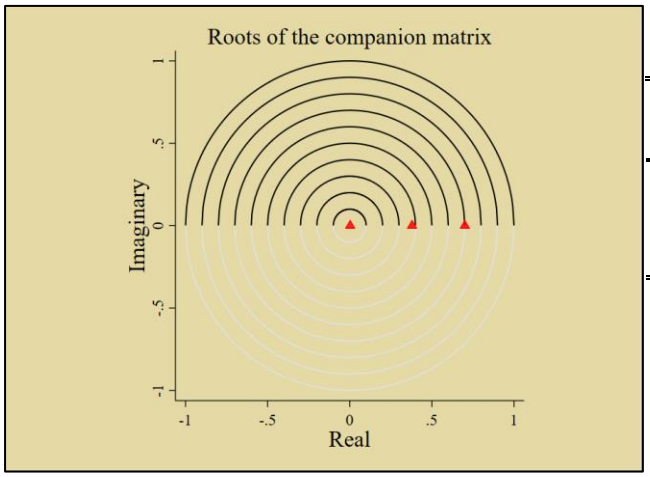
	Coefficient	Std.err.	z	P>|z|	[95% conf. interval]	
Growth of Arrivals						
AGR						
L1.	**.0391***	**.0225**	**1.74**	**0.083**	**-.0050**	**.0833**
GDP						
L1.	**2.8509*****	**.6273**	**4.54**	**0.000**	**1.6213**	**4.0803**
FDI						
L1.	**1.4492***	**.7971**	**1.82**	**0.069**	**-.1132**	**3.0115**
FAT	**-.0075*****	**.0026**	**-2.86**	**0.004**	**-.0127**	**-.0024**
Per capita Growth of GDP						
AGR						
L1.	**.0079****	**.0035**	**2.25**	**0.025**	**-.0010**	**.0149**
GDP						
L1.	**.5831*****	**.1042**	**5.59**	**0.000**	**.3787**	**.7875**
FDI						
L1.	**.2012*****	**.0738**	**2.73**	**0.006**	**.0565**	**.3459**
FAT	**-.0009*****	**.0002**	**-3.17**	**0.002**	**-.0015**	**-.0003**
Foreign Direct Investment						
AGR						
L1.	**-.0009**	**.0015**	**-0.65**	**0.513**	**-.0039**	**.0019**
GDP						
L1.	**.0968****	**.0394**	**2.46**	**0.014**	**.1955**	**.1741**
FDI						
L1.	**.4606****	**.2131**	**2.16**	**0.031**	**.0428**	**.8783**
FAT	**.0004**	**.0005**	**0.86**	**0.390**	**-.0006**	**.0014**

Table 7 Vector Autoregression Estimates[13]

[13] Note : * denotes statistical significance at the 10% level of significance, **denotes statistical significance at the 5% level of significance and *** denotes statistical significance at the 1% level of significance

5.6. Stability Diagnostics

Before attempting to draw any further conclusions on a panel VAR analysis, it is crucial to ensure that the model's components and their relationships are stable over time. Having a model that is stable, ensures that the conclusions and forecasts it may provide are valid and reliable. In Table 8, the analysis shows that all of the eigenvalues lie inside the unit circle, satisfying the stability condition. This means that the panel VAR constructed is invertible and has an infinite order Vector Moving Average representation, proving that it is suitable to create an Impulse Response Function, which is the main purpose of the analysis in order to draw conclusions. In Graph 1, we showcase the graph derived from the stability diagnostics test, that once again proves the validity and stability of the panel VAR model.



Graph 1 Stability Diagnostics Graph

Eigenvalue stability condition

Eigenvalue		Modulus
Real	Imaginary	
.701	**0**	**.701**
.379	**0**	**.379**
.003	**0**	**.003**

All the eigenvalues lie inside the unit circle. pVAR satisfies stability condition.

Table 8 Stability Diagnostics results

5.7. Granger Causality test

The last step before assessing the Impulse Response Function is to examine the interconnections of the model's variables through Granger's Causality test. The results are shown in Table 9[14] :

Panel VAR-Granger causality Wald test

H_0: Excluded variable does not Granger-cause Equation variable

H_1: Excluded variable Granger-causes Equation variable

[14] Note : * denotes the rejection of the null hypothesis of no Causality at the 10% level, ** denotes the latter at the 5% level and *** denotes the rejection of H_0 at the 1% level

Equation \ Excluded		chi^2	df	Prob > chi^2
AGR				
	GDP	**20.652**	**1**	**0.000*** **
	FDI	**3.305**	**1**	**0.069***
	ALL	**25.515**	**2**	**0.000*** **
GDP				
	AGR	**5.044**	**1**	**0.025** **
	FDI	**7.429**	**1**	**0.006*** **
	ALL	**12.824**	**2**	**0.002*** **
FDI				
	AGR	**0.428**	**1**	**0.513**
	GDP	**6.030**	**1**	**0.014** **
	ALL	**7.813**	**2**	**0.020** **

Table 9 Granger Causality test results[15]

By analyzing the results of the test, one can notice the interconnections of the model's variables. More specifically, there is a bi-directional relationship between the growth of arrivals and the per capita growth of the gross domestic product. The test shows that **GDP** helps predict **AGR** at the 1% level, while **AGR** helps predict **GDP** at the 5% level. This means that the growth of tourism arrivals for a country helps improve the growth of its per capita Gross Domestic Product and vice versa, as the two have a bi-directional causal relationship.

Secondly, the results show that the relationship between **AGR** and **FDI** is uni-directional at the level of 10%. This happens as it is shown that while the Foreign Direct Investment of a country Granger-causes its growth of arrivals, the reversed form of this sentence is not valid. In other words, **FDI** improves the growth of arrivals of a country while **AGR** does not improve the country's Foreign Direct Investment. This conclusion is enhanced if one re-visits Table 6, where in the GMM estimation where the foreign direct investment variable is used as a dependent variable, the growth of arrivals component is not statistically significant, failing to affect the dependent variable.

Thirdly, by examining the relationship regarding **GDP** and **FDI**, it is safe to state that the two variables have a bi-directional relationship. To add more context to that, it is seen by the *p*-values that **FDI** Granger-causes **GDP** at the level of 1% while **GDP** also Granger-causes **FDI**, but at the level of 5%.

5.8. Dynamic Multiplier Impulse Response Functions

In this section of the study, the dynamic multipliers are displayed. A dynamic multiplier function calculates the impact of a unit increase in an exogenous variable, on the endogenous variables over time (*Statistical Software for Data Science | Stata*, n.d.). In this study, the author uses a simple IRF-DM[16] where fatalities is the exogenous variable

[15] Note : * denotes statistical significance at the 10% level of significance, **denotes statistical significance at the 5% level of significance and *** denotes statistical significance at the 1% level of significance

[16] Impulse Response Function-Dynamic Multiplier

whose shock provide the impulses of growth of arrivals, per capita growth of GDP and foreign direct investment respectively, derived from a Gaussian estimation based on 300 Monte Carlo iterations for 4 horizons (meaning 4 years as the dataset is on an annual frequency) on the confidence level of 95%. The magnitude of all shocks is equal to one-standard deviation.

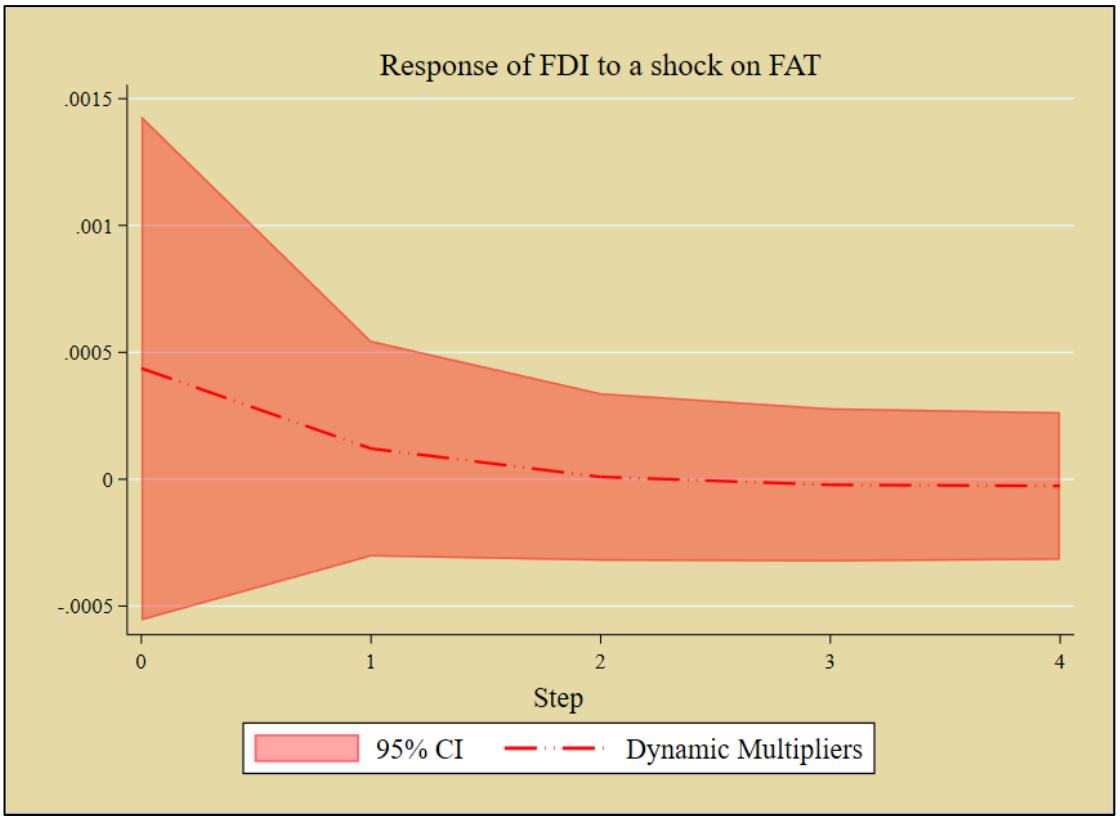
Additionally, it shall be noted that in discussing the impulse responses, we suppose that the start of the coordinate system symbolizes a state of equilibrium between the variables, where they are all equal to zero. Then, when $t=0$ an effect of a one-time shock of the exogenous variable produces the response of the variable of interest. This effect is called transitory if the variable returns to the equilibrium state after some time periods. If the variable behaves differently or settles to a new equilibrium point, then the effect is called permanent.

At first, we analyze the responses of the foreign direct investment and of the per capita growth of GDP respectively, after an impulse shock on the exogenous variable. After thoroughly analyzing and explaining these graphs, we proceed to the main phenomenon to be analyzed on this research, which is no other than the behavior of the growth of arrivals on a country after a deathly incident of terrorism.

- ***Response of foreign direct investment to a shock on fatalities***

The first case analyzed is the one of the Foreign Direct Investment as an endogenous variable. As seen on the results of the panel VAR GMM estimation, fatalities is a variable that is not statistically significant in terms of the FDI as a dependent variable, a fact that helps the reader understand that its dynamic multiplier should show no effect of the shock at all. Indeed, Graph 2 showcases exactly that. It is obvious that the variable of interest keeps being on the initial state as the confidence bands include 0 from the starting point, confirming the findings of the panel VAR estimation and inferring that

there is no interconnection between a terrible terrorism incident and the FDI variable, over the panel dataset of the 25 countries of the Western World as chosen by the author.



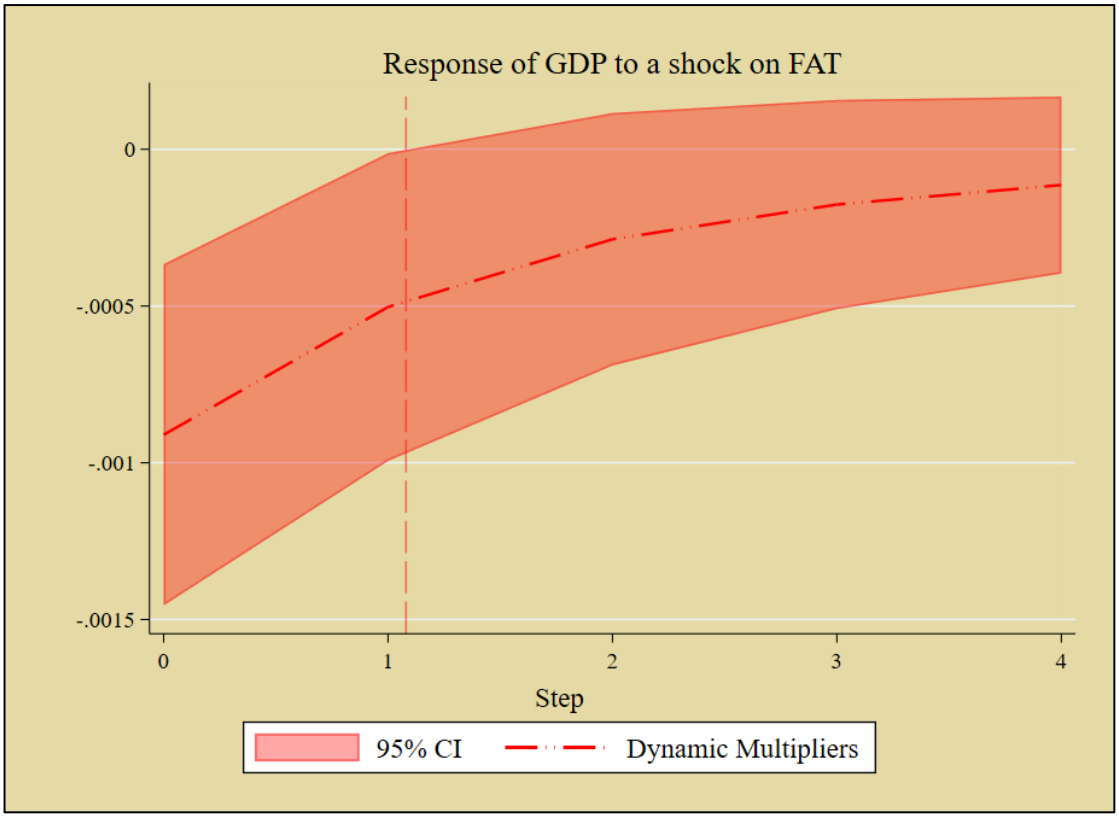
Graph 2 Dynamic Multiplier Impulse Response Function of FDI to a shock on fatalities

- ***Response of per capita growth of GDP to a shock on fatalities***

In the next step of evaluating the behaviors of the endogenous variables, this paper provides the dynamic multiplier function of the per capita growth of Gross Domestic Product as an endogenous variable and the fatalities of a terrorism incident as the exogenous. The findings again align to the estimation of the panel VAR model. At first, it is observed that fatalities has indeed a significant effect to the dependent variable, as it "moved" GDP to be negative and return to its equilibrium state after 1.08 time periods.

The latter means that, fatalities have a negative impact to the growth of per capita GDP, as also confirmed by the panel estimation findings. It also states that, this negative effect has a duration of 1.08 years, as it needs that much time period for the graph to return to its initial equilibrium state, meaning that the effect of terrorism on this variable is indeed real and negative, but temporary with a 1.08 period duration.

This result provides the inference that a country should focus on creating stability conditions that keep away any terrorism incident, as it would not only be dangerous for the safety of the people but would also affect the country's economic sector for at least a year long.



Graph 3 Dynamic Multiplier Impulse Response Function of GDP to a shock on fatalities

- ***Response of growth of arrivals to a shock on fatalities***

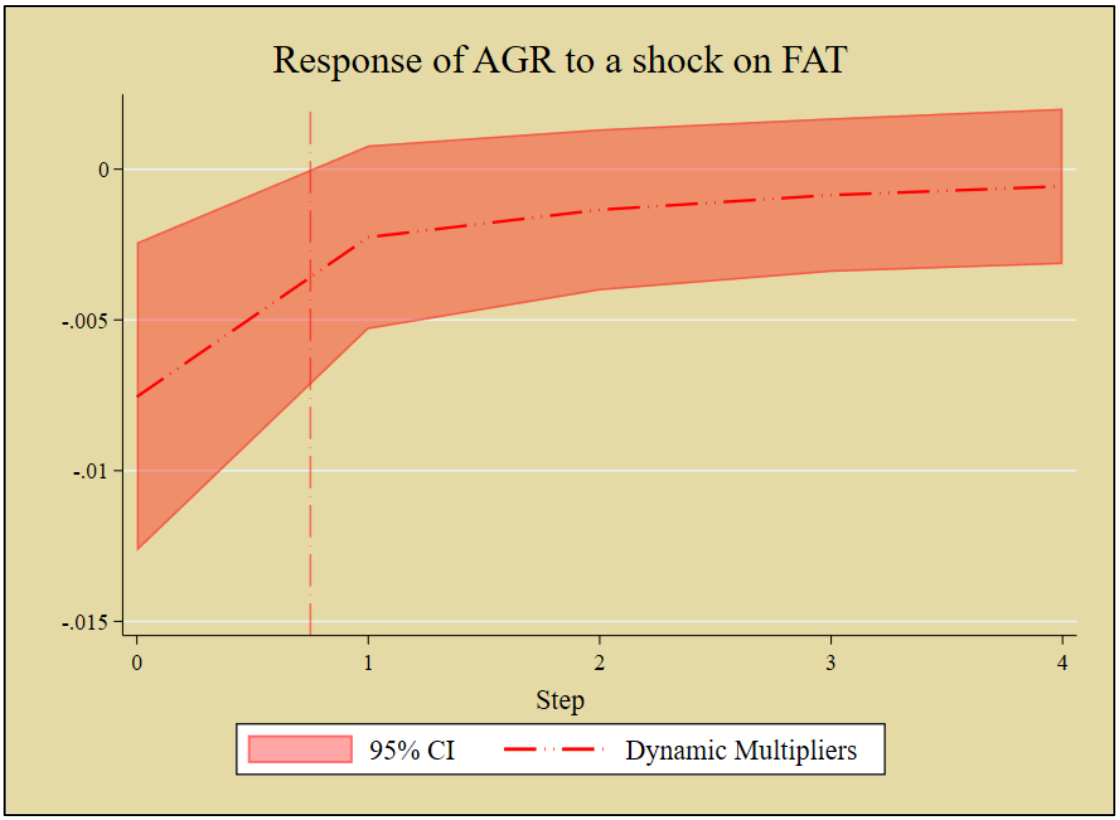
The last dynamic multiplier graph is the purpose of this whole research. Analytically, it is the point where the relationship between tourism and terrorism is examined by evaluating if the growth of arrivals for a country is influenced by a terrorist attack with fatal consequences.

To start with, it is easy to imply that such a grave event would have negative effects on every aspect of a country and mostly on its tourist arrivals. It only makes sense that a person's intension to visit a country would be altered if a deadly incident would occur on this country. Moreover in the case of this study, where 23 out of 25 of the countries' data come from Europe, and the other 2 are Canada and the United States of America. These countries are classified either as "developed" or at least as "developing", meaning that it is most unlikely for them to be in a state of constant conflict and instability such as for example countries as Somalia or Iran. That of course does not mean that a deadly incident cannot appear, as history has also shown. It is not accidental that the deadliest of all these events has happened in the United States.

It is obvious that the more developed the country, the more "appealing" it is for terrorists to create chaos in it, as it means that their action will affect more people and thus, will be seen from a bigger audience. On the other hand, the case of FDI - an important index for a country that represents the cross-border investment to a country

from a resident associated with another country - has proved that there is a possibility that a terrible incident could not affect all of the economic sectors in an economy.

By delving deeper into the results of the dynamic multiplier function of the latter, the negative effect of a deadly terrorist attack on the touristic sector of a country is more than obvious. More specifically, the negativity, which also aligns with the results of the GMM estimation, is shown on the Y axis. In detail, the values of the starting point of the graph that represents the behavior of AGR are now negative, showing that the one-unit shock of fatalities has pushed the growth of arrivals to a negative state, meaning a decline in AGR from a year to another for the country where the event was held.



Graph 4 Dynamic Multiplier Impulse Response Function of AGR to a shock on fatalities

Continuing the analysis one can observe the duration of the effect. In contrary to the case of the per capita GDP growth, the phenomenon stops to exist and the trajectory of the graph slowly returns to 0 after less than a year, and more specifically when t = 0.75. The latter is confirmed from the vertical dotted line. From the coefficient of the variables, that is also indicated on the Y axis one can see that the effect of the fatalities on the growth of arrivals is bigger compared to the effect on the per capita GDP growth – fatalities' coefficient regarding AGR as a dependent variable is -0.075 while regarding GDP as a dependent variable is -0.009. In other words, the findings solidify the conclusion that a deadly terrorism incident decreases the growth of arrivals in a harder way than it decreases the country's per capita growth of GDP, but this effect gets exceeded faster in the case of the growth of arrivals.

6. Conclusions

By the findings of this study, it is safe to state that a deadly terrorism event has indeed a transitory, yet seriously negative effect to the tourism sector of a country. Receiving a blow in tourism, escalates to having negative effects to other economic sectors generaly, as also shown in the research's results. By creating a panel dataset for 25 countries of the Western World in an annual frequency from 1995 to 2020 it is proved that fatalities that come out of a terrorist event have an almost year-long transitory effect to the country's arrivals as also a year-long effect to decline its per capita GDP growth. It was also found that the Foreign Direct Investment of a country is not affected directly if a fatal incident appears. The effect on the growth of arrivals has been found to be larger than that on the per capita GDP growth, but with a shorter duration.

To reach these conclusions, we conducted various stationarity tests to ensure that the variables chosen to form the panel Var model, have constant statistical characteristics. After ensuring that the variables are stationary, the panel Var model was constructed and estimated through the Generalized Method of Moments. In order to solidify that the findings were reliable, stability diagnostics were run, as also the Granger-causality Wald test in order to examine the interconnections within the panel Var components.

Finally, to derive accurate and detailed assumptions, the Dynamic Multiplier Impulse Response Functions were drawn through 300 Monte Carlo iterations for each of the endogenous variables, while using fatalities as an exogenous one-unit shock at a time. The graphs displayed the negative effects of terrorism to a country's tourism. The latter is another piece of proof on how important it is for a country to ensure safety in its grounds, as also stability in order to not allow any kind of terrorism incidents take place on its grounds.

In general it is showcased that it is highly important for all countries to find ways to eradicate these terrorism incidents, leaving no doubts of safety for travellers when trying to find a destination for their vacation etc, as not only people's safety is threatened but also their prosperity, even for a short time of period forward.

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