Lisbon School of Economics & Management
Universidade de Lisboa

MASTER
ECONOMICS

MASTER´S FINAL WORK
DISSERTATION

SHOCKS AND TOURISM DEMAND: EVIDENCE FROM PAST CRISES

ROMY CAROLINE HOREMAN

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SUPERVISION:
JOÃO TOVAR JALLES

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GLOSSARY

2SLS – Two Stages Least Squares.

BRICS – Brazil, Russia, India, China, and South Africa.

CDC – Centre for Disease Control and Prevention.

CRED – Centre for Research on the Epidemiology of Disasters.

EM-DAT – Emergency Events Database.

GDP – Gross Domestic Product.

GTD – Global Terrorism Database.

ISO – International Organization for Standardization

MERS – Middle East Respiratory Syndrome.

OLS – Ordinary Least Squares.

FE – Fixed Effects.

PLS – Panel Least Squares.

RE –Random Effects.

SARS – Severe Acute Respiratory Syndrome.

TRD – Travel-Related Diseases.

UNESCO – United Nations Educational, Scientific and Cultural Organization.

UNWTO – United Nations World Tourism Organization.

WDI – World Development Indicators.

WHO – World Health Organization.

WHS – World Heritage Sites.

ABSTRACT

The Covid-19 outbreak has had a huge impact not only on the daily lives of people all over the world, but also on their travel intentions. Though this event has not been the first one to shut down the tourism industry, it will with the forecast of more natural disasters and pandemic outbreaks due to global warming, also not be the last one. It is important to understand how different economies are affected by different kinds of shocks, to fasten the recovery of the destination image and with that the tourism demand for a country. By employing a 2SLS model for the period 1995-2017, with data from different sources but mainly from UNWTO and WDI, this study finds significant negative effects of terrorism and financial crises for tourist arrivals globally. However, these results show that they are heterogenous for different types of economies. This heterogeneity is confirmed by Panel Least Squares estimations and Granger-causality analysis on the relationship between tourism and economic impact.

KEYWORDS: International tourist arrivals, Tourism, Unexpected shocks, Economic impact, bi-directional relationships.

JEL CODES: C23; C36; H56; I15; Q51; Z32

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1. INTRODUCTION

The COVID-19 pandemic that emerged in Wuhan in December 2019, is raging all over the world and has had a dramatic effect on global economic activity. The World Health Organization declared the outbreak a global pandemic, marking the first pandemic since the 2009 Swine Flu Pandemic (H1N1). The number of infections and deaths has increased rapidly, and with these quantities, the coronavirus outbreak has long surpassed the consequences that were observed during the SARS epidemic in 2002-2003 (Kaushal and Srivastava, 2021).

Yet, this global healthcare crisis was not the only consequence of the pandemic outbreak. The COVID-19 pandemic has brought the complete travel industry to a halt and caused a collapse in economic activity worldwide. With borders being closed, air fleets being grounded, and a shutdown of the whole hospitality industry, travel and tourism is among the most affected sectors. The whole industry had to deal with major challenges due to these travel bans and border closures, quarantine requirements, and fear of spread.

Since the travel and tourism industry has become one of the biggest and most important sectors in world economy, contributing to 320 million jobs worldwide, it is important to understand the consequences of every type of crises in a deeper level (Goretti et al., 2021). In this way it will be easier to make predictions and decision for future pandemics and other types of crises. In the last 20 years only, the world had to deal with many other pandemics and epidemics, like the severe acute respiratory syndrome (SARS) outbreak in 2003, the Swine Flu outbreak in 2009, the Ebola outbreak in 2014, and the Middle East Respiratory Syndrome (MERS) in 2015 (Gössling et al., 2020). But next to these health-related crises, the tourism industry is affected by many other types of disruptive events. These are things like the September 11 terrorist attacks (2001), the global economic crisis commencing in 2008/2009, but also events like earthquakes or civil wars cause a big shock to the tourism industry and the overall economy of the area.

Existing research has mainly focused on the short-run effects of specific events (Kuo et al., 2008), or identified the consequences of just one event for only one country (Novelli et al., 2018). This research on only one country/type of crisis has limited use and does not give a full image of the consequences of crises on tourism flows (Zenker and Kock, 2020).

There is a call for analysis on more long-run effects on a wider scale, and this is the gap this study is trying to fill. To do this, an analysis of the long-run effects of different types of crises on different levels of the global economy has been done. The aim is to measure the size of the impact of past major pandemics, and sociopolitical, financial, and environmental shocks on tourism demand. This will be done by answering the following research questions:

- How did other crisis events affect the number of international tourist arrivals in the past two decades?
- Was this effect homogenous for all different types of economies?
- How does the level of tourism demand contribute to the tourism GDP?
- Is this effect homogenous for all types of economies?

Using dummy variables for the different measurable variables and several control variables chosen by past literature, the impact of such shocks on tourism proxies will be traced. The dataset is compiled for 148 countries for the period 1997-2017, using data from, among others, the World Development Indicators database, and databases composed by the World Tourism Organization (UNWTO).

The estimations are made by employing a Two-Stage Least Squares model for the period 1995-2017. Due to the panel nature of the data used in this kind of model, country and year fixed effects are considered. On a global level, the model only shows negative significant outcomes for the occurrence of terrorism and financial crises. However, when zoomed in on the type of economy, the effects of financial crises are heterogenous across different economies. This heterogeneity continues in the size of the contribution of the number of tourist arrivals to tourist expenditures. These results may help to understand better the relative impacts of any type of event on the different levels of economies. In this way, a useful guide for future policy decisions is provided.

This paper is divided into six chapters. In the next chapter, chapter 2, past findings will be discussed in the Literature Review. The third chapter will demonstrate the methodology, the data collection, and some stylized facts. The results will be displayed and explained in chapter 4. Finally, conclusions are made in chapter 5 and final shortcomings and recommendations will be provided in chapter 6 to give an outlook on future research.

2. LITERATURE REVIEW

2.1. Global tourism demand

Generally, the World Travel and Tourism Council (2019) have computed that, on average, tourism directly accounts for about 3.5 percent of global GDP. Here the contribution comes from 3 different types, namely: the direct, indirect, and induced contributions. First, the World Travel & Tourism Council (WTTC, 2019) explains that the direct contribution "includes GDP generated by industries that deal directly with tourists, including hotels, travel agents, airlines and other passenger transport services, as well as the activities of restaurant and leisure industries that deal directly with tourists".

Second, there are also additional indirect contributions from tourism to GDP and jobs. These are coming from the three factors: capital investment, government collective spending, and supply chain effects. Finally, there are the induced contributions to GDP and employment coming from those who are directly or indirectly employed by the tourism industry. These direct, indirect, and induced components are estimated to contribute for more than 10 percent of global GDP (Goretti et al., 2021).

However, these contributions from tourism to GDP are found to not be heterogenous for all types of economies. Kim et al. (2006) proved for Taiwan, Yazdi et al. (2017) for Iran and Banday and Ismail (2017) and Rasool et al. (2021) for all BRICS countries, that there exists a bi-directional relationship between tourism and economic growth for various emerging economies. This suggests that for emerging economies, tourism is not only driving economic growth, but this economic growth can play an important role in supporting the growth potential of the tourism sector.

The increasing global mobility has made the world incredibly interconnected, but has also, together with a shift in the global political landscape, shown its vulnerability to incidents of different natures (Yu et al., 2020). In the next chapters the destination decision and imaging by tourists will be explained, whereafter the different types will be highlighted. Finally, the future of the tourism industry will be roughly sketched.

2.2 Tourism destination image and its reaction to disasters

Wu and Shimizu (2020) stated: "Tourism is a service industry in which the nature of its product is an experience". This is because the quality of a trip or product is only known

to the customer after it has experienced it, which is why its travel decision tends to be based on image and perception rather than on reality (Zhang et al., 2014). While this destination image may be formed through internal processes based on the customer's visit and previous experience with a place (Kim et al., 2017), it is also influenced by external factors. These factors can come from exposure to additional information, derived from media sources or other communication (Wu and Shimizu, 2020). With the available information constantly changing, the individual's image of a travel destination is also dynamic over time.

When a crisis event occurs, whether it is of natural or, for example, terrorist origin, several studies (Li et al., 2018; Zenker et al., 2019) have found a negative effect on the image of a country or region. For example, Chen et al. (2016) have investigated the effect of the political conflicts between China and Taiwan, to understand how this event influenced the image that the Chinese and Taiwanese have of each other. The research concluded that a political conflict between two countries significantly damaged the country's image through the international stereotype they already had of each other. This had a direct effect on the cognitive and affective images and indirect effects on travel intention. Another similar research came from Heslop et al. (2008), in which they also examined the fading effect of disasters on the tourism destination image and showed that the impact of a negative event would reduce with time. It might therefore be a priority for countries to recover this destination's image post-crisis as soon as possible. In the case of health-related crises, the quality of health services at a destination is considered as "public infrastructure" influencing destination image (Chew and Jahari, 2014). If there is trust in the reliability and quality assurance of a destination with a positive health image, it can directly influence future travel intentions (Abubakar et al., 2017).

2.3 Impacts of several disaster types on tourism flows

Since tourism relies heavily on functioning infrastructure and visitor mobility, the tourism industry is highly vulnerable to interruption by many kinds of disasters (Ritchie, 2008; Lim, and McAleer, 2005; Neumayer 2004). These disasters are well-researched phenomena and have been of great value to the collective knowledge of tourism demand and its response to various types of shocks. While Yang and Chen (2009) have shown the vulnerability of tourism to other disease outbreaks, the influence of events as natural

disasters (Roselló et al., 2020), financial crises (Lim and McAleer, 2005), and terrorist attacks (Bianchi, 2006) has also been widely proven. In figure 3, the impacts of various big crises are displayed.

FIGURE 1 - Impact of several major crises on global tourism

Source: World Bank with their World Development Indicators, and the World Health Organization.

In this study, the shocks are divided into four types, namely: the health-related, environmental, sociopolitical, and financial shocks. First, the health-related shocks coming from epidemics and pandemics are discussed. WTTC (2019) calculated that, in economic terms, the travel and tourism industry accounted for 10.4% of the World Gross Domestic Product in 2019. This is a percentage that is often higher in less developed countries with a favorable climate, where tourism is responsible for a big part of the foreign exchange and income. Meanwhile, it's also these countries where the conditions are more favorable for infectious diseases (Sharpley and Tefler, 2015). Rosselló et al. (2017) investigated the relationship between tourism demand and the existence of travel-related diseases (TRD) in destinations. In their study, they investigated the influence of Malaria, Yellow Fever, Dengue, and Ebola on the evaluated destinations. They estimated that by eliminating these diseases in the affected countries would increase the total number of tourists globally by 10 million. Therefore, tourist expenditures would rise by 12 billion dollars. This avoidance of countries affected by pandemic outbreaks is studied as well by Cahyanto et al. (2016) about the outbreak of Ebola in Africa, and by Wen et

al. (2005) after the SARS outbreak in China. Karabulut et al. (2020) used the "Discussion about pandemics Index", which included SARS, Avian Flu, Swine Flu, MERS, Covid-19, Ebola, Influenza, and the search for WHO. In their studies, they concluded that the pandemics did not have any long-term effects on tourism because the pandemics were short-lived.

Second, the shocks coming from environmental disasters will be discussed. The intensifying effects of climate change and the growing complexity of our globalized world have changed the size of these types of disasters (Becken et al., 2014). Yet, the nature of these impacts depends on the type of shock and the flexibility of the affected system (OECD, 2014). Several studies have estimated the consequences of a natural disaster on the tourist arrivals of the country. For example, directly after the big earthquake in the Umbria region in Central Italy in September 1997, the impact on the number of visitors to the region was assessed by Mazzocchi and Montini (2001). The first month after the shock, the data showed that arrivals felt notoriously and this loss in tourism activity has been recorded until June 1998. Rosselló et al. (2020) added to this research that this decrease is likely due to "damages in infrastructure, key attractions and a wider weakening of the economy in the host country". On the other hand, man-made errors, such as the BP oil spill in the Mexican Gulf in 2010, are also causing a reduction in demand for travel to the affected area (Ritchie et al., 2014). This reduction in demand often spreads out to neighboring areas, even when they are not impacted by the event.

The size of the impact caused by disasters thus relies a lot on the type of the disaster. Rosselló et al. (2020) concluded that the biggest impact comes from volcanic eruptions, while other disasters like floods and tsunamis have a smaller and more short-term impact on the destination country. Ma et al. (2020) compared these natural disasters with human disasters like terrorism and explained that even though events like earthquakes seem to have a bigger negative effect on tourism demand, the tourist experience is more affected by terrorist attacks.

There are various reasons why there are fewer visitors to disaster-affected areas during and right after the event. The main reason has everything to do with the damage caused by a disaster, which prevents the affected area from engaging in tourism activity. Besides that, people's perception of risk and avoidance of regions that are deemed unsafe

causes a decline in tourist arrivals (Kozak et al., 2007). The World Bank (2017) explained there exists a link between poverty and natural disasters: "natural disasters increase global poverty". This type of disaster causes 26 million people to get into poverty each year while generating annual global losses of $520 billion. In their report, the World Bank states that measuring the impact of a natural disaster based solely upon economic loss often means the poor are neglected. This is because, as they explain: a flood or earthquake, for example, can be destructive to those who live in poverty, while having a trivial impact on a country's aggregate wealth or production.

Third, shocks with a financial origin will be discussed. The United States Business Cycle Dating Committee of the National Bureau of Economic Research (NBER) has defined an economic crisis as "a significant decline in economic activity spreading across the economy, lasting more than a few months, normally visible in the real gross domestic product, real income, employment, industrial production, and wholesale-retail sales" (2008). Globally, the most notorious crisis of the last two centuries might be the financial crisis of 2007-2008, but the Covid-19 recession, which is still happening at this moment, is already showing major impacts on the world economy as well.

There has been a lot of research about the effects of an economic crisis on tourism demand. This is often done for just one specific country, like by Okumus and Karamustafa (2005) about the Turkish crisis in 2001. For example, the financial crisis of 2008-2009 has been a source of literature with its widespread consequences, as done by, for example, Papatheodorou et al. (2010) and Ritchie et al (2008). Both studies revealed the same thing: asymmetrical effects generated by crises on countries that are at different stages of their tourism development, and the fact that this also depended on if the market of origin was affected as well or not. Smeral (2010) contributed to this literature by stating that after the crisis, domestic tourism was hit much less than long-distance travel. The study included only outbound travel from developed countries like Australia, the US, Japan, and the EU-15 countries. From an international macroeconomic view, they estimated that people from these countries were influenced to travel within their own countries by the many campaigns being set up for this purpose, which resulted in only expansive effects: people were influenced to travel instead of staying at home and saving those possible costs. Ultimately, tourists under an economic crisis are expected to show heterogeneous

behavior. This depends on the country or region, but also the households' income level, the climate of the country or region (Cho, 2010).

And finally, tourism demand may be affected by the advent of social or political shocks, which includes circumstances such as conflict history, political violence, or human right issues. These types of shocks are mentioned often in the academic literature as well. With war probably being the largest shock that the hospitality and tourism industry can face, there have been various important works published on the complexity of this relationship (Butler and Suntikul, 2013; Mofakkir and Kelly, 2010). Neumayer (2004) has had the most significant contribution to this literature, by examining the tourist arrivals at destinations and the political factors that seem to restrain tourism arrivals. In the study, empirical evidence was found that many different political factors are found to be unattractive by tourists while choosing a destination, and therefore have a negative impact upon tourist arrivals in the destination country. Lanouar and Goaied (2019) contributed by comparing the impacts of political violence with terrorist attacks on the number of tourist arrivals and overnight stays in Tunisia. The results showed that more serious and long-term impacts came from terrorist attacks. Ahlfeldt et al. (2015) analyzed the impact of terroristic attacks and confirmed previous work done by Pizam and Fleischer (2002). Their study concluded that both the frequency and intensity of terror attacks can be decisive for the time during which effects are noticeable. Lastly, Lepp and Gibson (2003) pointed out the serious impact of terrorist attacks on tourism by stating that if terrorists want to destroy a country's economy, the countries with major exports coming from tourism are the best targets.

Table I gives an overview of the most influential disasters is displayed for each region considered in this study.

TABLE I

OVERVIEW OF MOST INFLUENTIAL DISASTERS IN THE PAST TWO DECADES.

	Pandemics*	**Environmental disasters**	**Terrorism**	**Financial crisis**
East Asia & Pacific	*SARS Outbreak 2002-2003:* Mostly Asian countries (765 fatalities) *Avian Flu 2003-2006:* Vietnam, Indonesia, Thailand and China: 134 fatalities	*Earthquake 2004:* Indonesia (165.708 fatalities) *Cyclone 2008:* Myanmar (138.366 fatalities) *Earthquake 2008:* China (87.476 fatalities)	*Bombings (2002):* Bali, Indonesia (202 fatalities) *Armed Assault (2019):* Christchurch, New Zealand (51 fatalities)	*East Asian crisis (1997):* Started in Thailand *Banking crisis (2003):* Myanmar
Europe & Central Asia	*Swine Flu outbreak (2009):* 2,889 fatalities in Europe	*Extreme temperature:* Russian Fed. 2010 (55.736 fatalities) *Extreme temperature:* Italy 2003 (20.089 fatalities) *Extreme temperature 2003*: France (19.490 fatalities)	*Terrorist attack (2004)*: Madrid, Spain (191 fatalities) *Bombing (2015):* Paris, France (130 fatalities) *Hostage (2002)*: Moscow Russia (170 fatalities) *Hostage 2004:* Beslan, Russia (385 fatalities)	*Russian crisis (1997):* Came out of post-Sovjet period. *Financial crisis (2008-2009):* Most countries in Europe *European crisis (2010-2013):* Greece, Ireland, Portugal, and Cyprus
Latin America & Caribbean	*Zika outbreak (2015):* Brazil and later spread out mostly over both Americas (211,770 cases denoted by the end of 2016 in Brazil)	*Earthquake 2010:* Haiti (222.570 fatalities) *Flood 1999*: Venezuela (30.000 fatalities)	*Bombings (2002):* Bojaya, Colombia (119 fatalities)	*Latin American debt crisis (2001-2002):* Argentina *Banking crisis (1998-1999):* Ecuador *Banking crisis (2002):* Uruguay
Middle East & North Africa	*MERS outbreak (2012):* Saudi Arabia	*Earthquake 2003:* Iran (26.796 fatalities) *Earthquake 2003:* Algeria (2266 fatalities)	Bombings (2007): Kahtaniya, Iraq (500 fatalities) *Bombings (2007-2014):* Afghanistan (20,000 fatalities) *Bombings (2017):* Bir al-Abed, Egypt (305 fatalities)	Economic crisis (2019): Lebanon
North America	*SARS Outbreak 2002:* Canada and the United States (278 cases of which 44 fatalities) *Zika Outbreak:* U.S. Territories (36,512 cases reported)	*Cyclone 2005:* United states (1.833 fatalities)	*Bombing 1995):* Oklahoma, United States (168 fatalities) *September 11 attacks:* United States (2977 fatalities)	*Energy crisis (2000s):* United States *Financial crisis (2008):* All north American countries
South Asia	*Swine Flu Outbreak 2009*: Started in the U.S.A. but spread as well to South Asian countries	*Earthquake 2005:* Pakistan (73.338 fatalities) *Earthquake 2004*: Sri Lanka (35.399 fatalities) *Earthquake 2001:* India	*Bombings (2019)*: Sri Lanka (2,977 fatalities) *Bombings (2005):* Mumbai, India (209 fatalities)	*Financial crisis (2010):* Mostly in India and Sri Lanka

		(20.005 fatalities)	*Bombings (2019): Sri Lanka* (253 fatalities)	
Sub-Saharan Africa	*Ebola Outbreak:* 2014-2016: West African countries (mostly Guinea, Sierra Leone and Liberia) 2014-2016: 11.325 fatalities	*Droughts (2010):* Somalia (20.000 fatalities)	*Armed Assault (2013):* Nairobi, Kenya (67 fatalities) *Bombings (2017):* Mogadishu, Somalia (350 fatalities)	*Banking crisis (2017-2018):* Ghana

Note: Information is retrieved from databases of WHO, EM-DAT, and Laeven and Valencia (2020). Information about terrorist attacks is retrieved from since911.com.

2.4 Differences with past crises and the future of tourism

It's not the first time a pandemic has gripped the world, and it will also not be the last time. With the increasing globalization and climate change, the chance of a pandemic might be getting bigger and bigger. But what is different this time, and at which points can we compare it to previous crises?

If you look at the disease presentation of covid compared to other influenzas, they show themselves in a very similar way. WHO explains it as "they both cause respiratory disease, which presents as a wide range of illness from asymptomatic or mild through to severe disease and death" (2020). The big difference with other influenza is the fact that people can start shedding the virus several days in advance of symptoms (Bai et al., 2020). This results in asymptomatic people transmitting Covid-19 before they even know to self-isolate or take other measures and a very rapid spread across areas.

However, the coronavirus pandemic is not only a natural, but also a socio-political or human-made disaster (Zenker and Kock, 2020). As mentioned already, some diseases like Ebola and Avian Flu show comparable patterns on smaller scales. Thereby, the coronavirus-induced economic crisis shows similarities with the economic crisis in 2008 discussed by Papatheodorou et al. (2010) or how the country's image is affected by political conflicts (Alvarez and Campo, 2014). It is clear that the Covid-19 outbreak has changed travel behavior, reducing the willingness to take a trip (Zhang et al., 2021). People were forced to postpone their travel plans for at least 6 months after the recovery of safe health conditions (Li et al., 2020). Everyone knows that the future is uncertain, and while most studies have mainly concentrated on analyzing the short-term implications of this pandemic, the first longer-term estimations can be made.

Zimmermann et al. (2020) suggest a possible relationship between the increasing globalization and pandemics and conclude that more globalized countries are affected faster and more intensely by the Covid-19 outbreak. The long-term effects are estimated to have some indirect effects as well, one example being the priority of sustainability in the tourism industry (Zenker and Kock, 2020). These indirect effects are coming from the close connection with the food production industry, for which there is evidence that many virus outbreaks (SARS, MERS, Covid-19) might have commenced there (Pongsiri et al., 2009). As many tourism businesses collect their food from global markets at the lowest price possible, contributing to a high amount of food waste, industrialized food production stays (Hall and Gössling, 2013). This industrialized food production is also blamed for a significant decline in wildlife and deforestation. It is well known that one of the biggest consequences is global warming and the increase in natural disasters, like droughts and floods that are happening more frequently. The Covid-19 outbreak might be the wake-up call that is necessary to make a reconsideration of the global tourism system possible. It is worth questioning whether more arrivals would consistently imply greater benefits.

2.5 Hypotheses

The four different types of disasters are studied systematically and comparatively to identify the effect of events on tourism. The different shocks observed here are pandemics, environmental disasters, terrorism, and financial crises. The following hypotheses are tested:

Hypothesis 1: Pandemics have a negative influence on the number of tourist arrivals.

Hypothesis 2: Environmental disasters have a negative influence on the number of tourist arrivals.

Hypothesis 3: Terrorism has a negative influence on the number of tourist arrivals.

Hypothesis 4: Financial crises have a negative influence on the number of tourist arrivals.

Hypothesis 5: The contribution of the number of tourist arrivals on tourist expenditures is homogenous for the different economies and regions.

In the next chapter, the method will be explained, together with the data collection, after which these eight hypotheses will be tested.

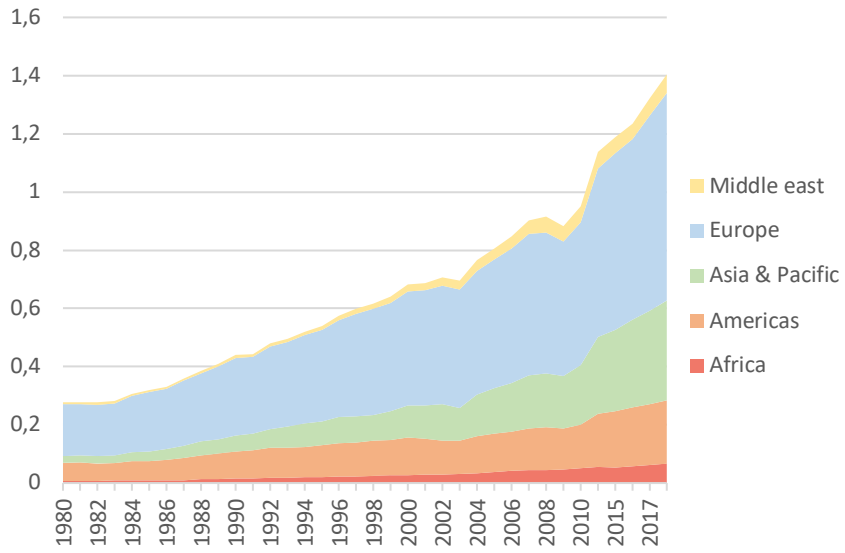
3. METHODOLOGY AND DATA

3.1 Stylized facts

In this section, data and trends are shown of global tourism demand during the past two decades.

Due to the increasing global interconnectedness, rising income levels, and falling costs in aviation and accommodation, an expansion of the number of international tourists from 680 million in 2000 to more than 1.4 billion by the end of 2018 (Figure 1) is made possible.

FIGURE 2 - International Tourist Arrivals by World Region (in billions)

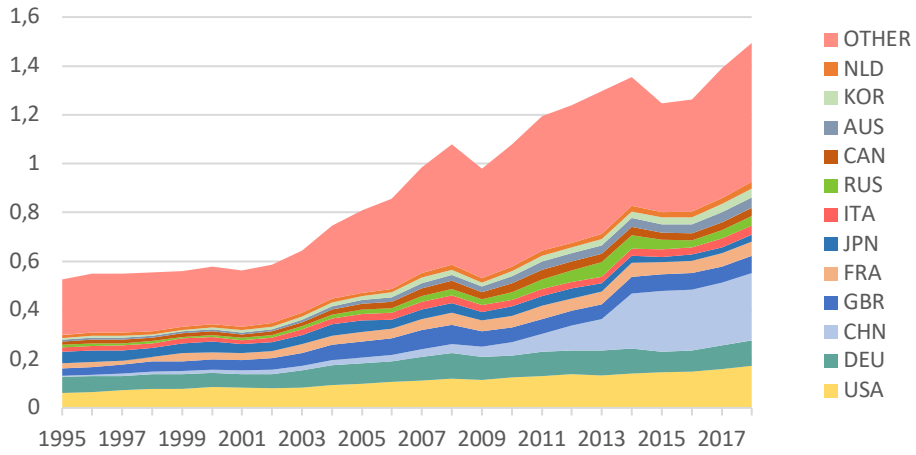


Source: United Nations World Tourism Organization; and IMF staff calculations.

As Figure 1 shows, the position of Europe of being the most visited region is still untouched but is now followed by Asia. The Americas are the region coming next, while the Middle East is still the least visited region (UNWTO, 2019). This rise in tourist arrivals worldwide have resulted in an increase of expenditures to around 1.5 billion US dollars by the end of 2019 (Figure 2). The graph demonstrates the huge increase of expenditures made by the Chinese, followed by the United States and Germany. For this

reason, the Asian countries are now accounting for around a fifth of international tourism spending and tourist arrivals.

FIGURE 3 - International Tourist Expenditures (in trillions)



Source: The World Bank; Country list uses International Organization for Standardization (ISO) country codes

UNWTO has calculated that with more than 70 percent of total tourism spending in 2019, domestic tourism is dominating the tourism industry. Domestic tourism spending implies here ´the money spend within the country of residence´ and has nearly doubled in value from 2.2 trillion US dollars in 2015 to 4.5 trillion US dollars by 2019.

3.2 Empirical model for tourism demand

To estimate or forecast tourism demand, different techniques have been used in recent decades. Research is done at both the macroeconomic and microeconomic levels, where the latter tends to underestimate the true economic impact of different kinds of crises. This is because the macroeconomic factors and externality effects are not included in microeconomic analysis (Sachs and Malaney, 2002). Time series models have been presented as a suitable methodology for the observation of the effects of epidemic diseases (Kuo et al., 2008), the economic crisis (Smeral, 2010), environmental disasters (Shareef and McAleer, 2005), and finally as well for terrorist attacks (Samitas et al., 2018). However, when the effect of a relatively stable variable must be evaluated, time series models might not be the best method applicable. Additionally, Hsiao (2014) explains that when panel data is being used in research, it might shape the econometric

technique to create a broad set of information and, for that reason, allows for the control of heterogeneity and reduces the problem of collinearity. By using dummy variables, the variability of the variables used in this study is not very high, and there is no expected dependence on the previous year since the occurrence is random.

In this study, the following variables are added as control variables for this panel data technique. First, the Gross Domestic Product (GDP) and the population of the destination country are used to demonstrate the size of the country and its trade. Leitão (2010) and Surugiu et al. (2011) suggest that population and income are the main determinants of tourism demand for Portugal and Romania, rather than the relative prices. Second, the living circumstances in terms of life expectancy and the crime rate in the country are included. Finally, the World Heritage Sites (WHS) are added as variable to indicate the attractiveness of the destination country, from which it is expected that countries with more WHS's are more likely to get more tourist arrivals (De Simone et al., 2018). Therefore, the empirical model that is used here is as follows:

$$(1) \quad LnTou_{it} = \beta_0 + \beta_1 LnGDP_{it} + \beta_2 LnPop_{it} + \beta_3 LnLifeExp_{it} + \beta_4 WHS_{it} + \beta_5 Crime_{it} + \beta_6 Crisis_{it} + \varepsilon_{it}$$

Where the dependent variable *LnTou* is measured for country *i* in year *t*. The error term is given by ε. The econometric software applied in this study is E-views 11.

3.3 Data selection

This study uses yearly panel data for 148 countries and will cover the period of 1995-2017. This is chosen because the data has not been measured for every country in the world, and the tourism data starts from 1995. As a dependent variable *LnTou*, the natural logarithm of international tourist arrivals, is considered. This variable is used to measure the international tourism demand. The data for this comes from the datasheets of the United Nations World Tourism Union (UNWTO).

The explanatory variables are defined as follows. The destination specific variables *LnGDP*, and *LnPOP*, which stand for the per capita real gross domestic product of the destination country and the population, respectively. The information for these variables is retrieved from the World Bank in their World Development Indicators (WDI). *LnLifeExp* is the life expectancy at birth in the destination country and the data for this comes from the World Bank as well. There are several ways of evaluating the safety and

security of tourists. Rosselló et al. (2020) suggested the use of a proxy for the crime rate, defined as the number of homicides per 10,000 inhabitants at the destination. The data for this proxy is retrieved from WDI as well. The data for the World Heritage List (WHL) is collected from the UNESCO World Heritage List website.

Here, like in similar literature, for the variables *Tou*, *GDP*, *Pop*, and *LifeExp* are taken in their natural logarithms (ln). This is done to reduce heteroskedasticity and to remove any correlation between the independent variables. As a result, these coefficients can be interpreted as elasticities.

The variable of interest in this research is *Crisis*, which stands for the variables for all four types of crises. This is a dummy variable and is based on the occurrence of a crisis in a certain year. When the event has occurred in the country in that specific year, the dummy variable will denote 1, and 0 otherwise. The sources for this variable will be presented next.

The data that covers the environmental shocks is retrieved from the Centre for Research on the Epidemiology of Disasters (CRED), which makes data available through the Emergency Events Database (EM-DAT). This database is used by Rosselló et al. (2020) as well and was created with the initial support of the World Health Organization (WHO) and the Belgian Government. This variable covers environmental disasters caused by droughts, earthquakes, extreme temperatures, floods, landslides, mass movements, storms, volcanic activities, and wildfires.

Second, the data that covers the shocks coming from terrorism is sourced from the National Consortium for the Study of Terrorism and Responses to Terrorism (2020). They put together the Global Terrorism Database (GTD, 2015), where they define terrorism 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. This data covers the period 1995-2017 and covers any major attack in the categories: Armed Assault, Assassination, Bombing/Explosions, Facility/Infrastructure attack, Hijacking, Hostage taking and unarmed assault.

Third, the data that covers the health-related shocks is retrieved from different databases put together by different sources. The data for all the different types of

epidemics is retrieved from either the World Health Organization, or from the Centre for Disease Control and Prevention (CDC). The data contains the following epidemics in chronological order: SARS (2003), Avian Flu (2003), Swine Flu or H1N1 (2009), MERS (2012), Ebola (2014), Zika (2016).

Finally, the data for the financial crises variable is retrieved from the database made available by Laeven and Valencia (2020). The authors have been updating their database of systematic financial crisis episodes around the globe for the period 1970–2013. For this database, they included banking crises, currency crises and sovereign Debt crises.

3.4 Model estimation

The final model will be estimated from different estimation techniques, which will be compared in this section. The base OLS equation is estimated by a panel fixed effects (FE) technique, based on the Hausman-Test for random effects. By adding fixed effects to the model, the country and time invariant characteristics can be absorbed (Santana-Gallego et al., 2020). However, these fixed effects models may suffer from omitted variables bias and be affected by endogeneity problems, which happen when $Cov(x_t, u) \neq 0$, where x represents an independent variable. These endogeneity problems can be caused by the two-way causality between economic outcomes and epidemics (Acemoglu and Johnson, 2007). These problems can be solved by using instrumental variables methods, which in this study will be done using the Two-Stage Least Squares (2SLS) estimator.

3.4.1 Two-Stage Least Squares estimator

The Two-Stage Least Squares regression uses, like said before, instrumental variables that are uncorrelated with the error term. In the first stage, the estimated values of the problematic predictor will be computed, after which those computed values are used to estimate a linear regression model in the second stage. The instrumental variables used for this method are the lagged values of the independent variables, since lagged values are less likely to be influenced by current shocks and therefore gives $Cov(x_{t-1}, u) = 0$. In the table below, the two different outcomes are estimated by the fixed effects model for both the cross section and for the period, as well as for no fixed effects. The autonomous

variable for *Crisis* is not included to make the right fit for the base model. The estimations of 2SLS model are shown in table II below.

TABLE II

TWO-STAGE LEAST SQUARES MODEL ESTIMATIONS

Variable	Fixed Effects	None
Constant	3.716***	-6.161***
	(2.145)	(-6.159)
LnGDPit	0.090***	0.596***
	(4.761)	(27.822)
LnPopit	0.117	-0.075***
	(0.986)	(-3.369)
LnLifeExpit	1.646***	1.684***
	(5.631)	(6.624)
WHSit	-0.037***	0.035***
	(-8.444)	(10.006)
Crimeit	-0.008***	0.004**
	(-3.754)	(1.999)
Adjusted R squared	0.963	0.661
Kleibergen–Paap F-statistic	440.600	1116.946

Note: Robust Standard Errors are in parentheses. Here the p-values are given by *p<0.1, **p<0.05, and ***p<0.01.

The results of both models show that for all variables, with the exception of *LnPop* for the FE model, the coefficients are significant for at least 5% or higher. The values for the adjusted R-squared show that at least 66.1% variation in international tourist arrivals has been explained by this model. The adjusted R-squared for the FE model shows a much higher value, namely 96.3% being explained. Furthermore, the F-statistics for the FE model and the non-cross sectional fixed effects model are respectively 440.600 and 1116.946. The model tests for the null hypothesis that instruments are weak. The statistics show values that are quite high and reject the null hypothesis for both models. This suggests that the instruments are not weak and that the model is a good fit.

4. RESULTS

4.1 Two-stage Least Squares

After estimating the best fit for this regression, the Two Stage Least Squares model will be applied to all four regressions by including its specific crisis variable. Table III

presents the estimated coefficients and different regression statistics for the four estimated equations, including the *Pandemics*, *Environmental disasters*, *Terrorism*, and *Financial crises*. The results show the average effects of all independent variables on tourist arrivals. This is an average of the whole period 1995-2017.

TABLE III

IMPACT OF CRISES ON INTERNATIONAL TOURIST ARRIVALS BY 2SLS

Variable	Pandemics	Environmental disasters	Terrorism	Financial crises
Constant	3.671**	3.205*	2.584	3.377*
	(2.117)	(1.650)	(1.387)	(1.947)
$LnGDP_{it}$	0.090***	0.091***	0.089***	0.102***
	(4.525)	(4.448)	(4.331)	(5.106)
$LnPop_{it}$	0.130	0.143	0.248**	0.122
	(1.212)	(1.232)	(2.034)	(1.149)
$LnLifeExp_{it}$	1.612***	1.692***	1.468***	1.639***
	(5.455)	(5.501)	(4.694)	(5.610)
WHS_{it}	-0.037***	-0.037***	-0.035***	-0.037***
	(-8.399)	(-8.238)	(-7.611)	(-8.396)
$Crime_{it}$	-0.008***	-0.009***	-0.008***	-0.008***
	(-3.689)	(-3.680)	(-3.226)	(-3.702)
$Pandemics_{it}$	-0.085			
	(-0.872)			
Environmental $disasters_{it}$		-0.234		
		(-0.648)		
$Terrorism_{it}$			-0.401**	
			(-3.226)	
Financial $crises_{it}$				-0.181***
				(-2.818)
Kleibergen – Paap F-statistic	438.034	438.013	438.966	439.390
Adjusted R-squared	0.962	0.960	0.959	0.963

Note: Robust Standard Errors in parentheses. Here the p-values are given by *P<0.1, **P<0.05, and ***p<0.01.

The table shows that the adjusted R-squared value is for all crisis variables at least 0.959 or higher, which means that a 95.9% variation in international tourist arrivals has been explained by this model. Besides that, the estimates for the crisis variables show the right signs, because of their expected negative influence on tourist arrivals. *Financial crises* and *Terrorism* give a significant result of at least 10% or higher. This is not the

case for the occurrence of both pandemics and environmental disasters, which are insignificant.

Two of the country specific variables, the GDP per capita and the life expectancy at birth, show significantly positive coefficients, which suggests that tourists prefer to travel to richer countries in which the circumstances are good enough to have a high life expectancy at birth. However, the number of inhabitants of the population is not significant for all four variables but is positive significant when terrorism occurs.

The most unexpected outcome is the negative effect of *World Heritage Sites* on tourist arrivals, indicating that tourists prefer to go to countries and areas with fewer tourist attractions to visit. This is in contradiction with the positive effects estimated by De Simone et al. (2018) for the World Heritage Sites in Italy.

The final control variable, *Crime*, which is the proxy for the crime rate in a country, shows an expected significant negative influence on tourist arrivals as well. This indicates that the more unsafe a country is, which means an increase in the number of homicides (per 10,000 inhabitants), the fewer tourists it will attract.

The variables of interest in this study are *Pandemics*, *Environmental Disasters*, *Terrorism* and *Financial crises*. All show negative effects on tourist arrivals, although they are not all significant. A negative coefficient means here that the economic damage from these events is likely to reduce tourist arrivals. The model estimates that *Terrorism* and *Financial crises* are at least 5% significant, of which Terrorism has the biggest influence on the number tourist arrivals, namely a 40.1% reduction in tourist arrivals when a terrorist attack occurred a given year. *Economic crises* appear to be the second most intensive type of disaster, which occurrence is expected to affect the number of tourist arrivals by 18.1%. The final shock is coming from *Pandemics* and is expected to reduce tourist arrivals by 18.05%. Finally, the shocks coming from *Pandemics* and *Environmental disasters* both don't result in this significant negative relationship with the number of tourist arrivals.

Then the influence of these four crisis variables is tested for the different types of economies as well as for the region in which they are in. These regions are divided as done by the World Bank, and the results of this are show in table IV below.

TABLE IV

IMPACT OF CRISES PER REGION

Region	Pandemics	Environmental disaster	Terrorism	Financial crises
East Asia & Pacific (551 observations)	-0.046 (-0.258)	-1.093 (-1.376)	-0.454** (-2.572)	-0.062 (-0.355)
Europe & Central Asia (1104 observations)	0.551 (1.216)	-0.483 (-0.996)	-0.914 (-0.806)	-0.480*** (-4.280)
Latin America & Caribbean (768 observations	-0.191 (-1.345)	0.341 (0.444)	-0.419* (-1.736)	0.113 (1.015)
Middle East & North Africa (360 observations)	-0.158 (-0.595)	1.050 (0.376)	1.262 (0.103)	-0.216 (-0.478)
Sub-Saharan Africa (528 observations)	0.452 (0.634)	0.579 (1.271)	-0.881 (-2.212)	0.090 (0.498)

Note: Robust Standard Errors are in parentheses. Due to the low degree of freedom, North America (72 observations) and South Asia (168 observations) are left out. Here the p-values are given by *p<0.1, **p<0.05, and ***p<0.01.

The table shows that there are only negative significant results for terrorism in the regions East Asia & Pacific and Latin America & Caribbean. For Europe & Central Asia, the only significant but negative result is estimated for the variable financial crises. The occurrence of terrorism is expected to decrease tourism demand in the East Asia & Pacific region by 45.4%, and in Latin America & Caribbean by 41.9%. For Europe & Central Asia, the occurrence of financial crises shows the only significant results, which is expected to decrease tourism demand by 48%. For the other regions, the impact of different crises is not significant.

Finally, the economies are separated in Advanced Economies, Emerging Economies, and the Lowest Income Economies. The outcomes are shown in table V.

TABLE V

EFFECTS OF CRISES PER TYPE OF ECONOMY

Income group	Pandemics	Environmental disasters	Terrorism	Financial crises
Advanced Economies (51 countries)	-0.151 (-1.295)	0.025 (0.078)	-0.309 (-0.932)	-0.167*** (-3.546)
Emerging Economies (47 countries)	-0.103 (-0.819)	-0.097 (-0.173)	-0.067 (-0.363)	0.401** (2.022)
Low-income Economies (50 countries)	-0.191 (-0.876)	0.616 (0.882)	-0.933*** (-2.579)	0.177 (1.073)

Note: Robust Standard Errors in parentheses. Here the p-values are given by **P<0.05, and ***P<0.01.

For the advanced economies, only the occurrence of financial crises is estimated to have a significant but negative result, and they are therefore expected to reduce the annual number of tourist arrivals in the destination country. Its occurrence is expected to reduce the number of tourist arrivals by 16.7%. The same holds for the emerging economies, where the only significant effects are expected to come from financial crises. This shock is expected to positively affect the number of tourist arrivals by increasing it with 40.1%. For the low-income economies, only terrorism is expected to have significant impact. The occurrence of terrorism is expected to reduce these numbers by 93.3%, while financial crises are expected to increase tourist arrivals by 37.16%. For the low incomes, none of the coefficients are significant. However, based on the comment of WHO mentioned earlier, it was expected that environmental disasters would have significant negative effects on tourist arrivals in this type of economy as well.

4.2 Panel Least Squares model for tourist expenditures

In the second stage, the impact of the increase in the numbers of tourists arriving in the destination countries can be estimated for each type of economy. In this way, the economic consequences of the crisis events can be assessed per income group. Assumed here is that there is a linear relationship between the total number of tourists and tourist expenditures by foreign tourists (Rosselló et al., 2017). The data for these expenditures is retrieved from the World Bank Group and is defined as the expenditures (in US$) by international inbound visitors, including payments to national carriers for the

international airport. To assess this relationship, the following equation is estimated in the same way as done by Rosselló et al. (2017):

$$(2) \quad LnExp_{it} = \phi_0 + \phi_1 LnTou_{it} + \omega_t + \upsilon_i$$

Where the dependent variable *LnExp* is the total tourism expenditures by foreign tourists in a destination country *i* during period *t*; *LnTou* is made up out of the same data as for Equation (1); ϕ_1 is the parameter to be estimated; ω_t are the year and country fixed effects; υ_i is a well-behaved disturbance term. This linear model is estimated for the 148 countries for the period 1995-2017, and then estimated again after a division in levels of market economies is made. It needs to be mentioned here that only the direct effects of the occurrence of crises are measured (Rosselló et al., 2017). There could be multiplying effects accompanied by an increase in GDP on tourism demand, which are not considered in this study. The results of this Panel Least Squares model are demonstrated in Table VI

TABLE VI

PLS MODEL FOR TOURIST EXPENDITURES

	All	Advanced economies	Emerging economies	Low-Income countries
LnTou	0.491***	0.201***	0.515***	0.410***
	(23.512)	(5.591)	(14.955)	(9.814)
Adjusted R-Squared	0.968	0.983	0.955	0.936
F-statistic	532.579	813.461	301.261	192.620

Note: Robust Standard Errors in parentheses. Here the p-values are given by ***P<0.01.

Table VI shows the relationship between the tourist arrivals and the tourist expenditures for all countries together but also for the sub-categories. The high Adjusted R-Squared statistic of at least 94.1% shows that tourist arrivals is a good predictor of tourist expenditures, which is proven by Rosselló et al. (2017) as well. This verifies the link between the number of international tourism arrivals and the economic impact of countries. The coefficients are for all groups significantly positive. However, the relationship between the number of tourist arrivals and its contribution to the tourism GDP is not equal for every level of income. The highest coefficient is for the Emerging economies, for which a 1% change in *LnTou* is expected to increase tourist expenditures by 0.59%. For the Low-income and Advance economies, the percentages are,

respectively, 0.42% and 0.21%. It is remarkable that the average contribution of tourist arrivals to tourism GDP is around 0.45% but is much lower for Advanced Economies.

4.3 Granger-Causality test

When the relationship between these two variables is further analyzed by applying the Granger-Causality test, it might be possible to find possible reasons for the heterogenous contribution of an increase in volume of tourists. The null hypothesis states the non-causality between tourist expenditures and the number of arrivals. The outcomes for this test are shown in table VII.

TABLE VII

GRANGER-CAUSALITY TEST PER TYPE OF ECONOMY

	LnTou → LnExpenditures	LnExpenditures → LnTou
All	37.024***	3.411**
Advanced Economies	2.727**	0.776
Emerging Economies	6.180***	6.305***
Low-income Economies	4.724**	1.245

Here the p-values are given by *p<0.1, **p<0.05, and ***p<0.01.

The table shows a two-directional Granger relationship for emerging countries and on a global level. This means that a growth in tourism leads to a higher level of economic development, and the other way around. These findings replicate those found by Rasool et al. (2021) and Banday and Ismail (2017) for the context of BRICS countries. This confirms the economic-driven tourism growth hypothesis in this type of economy and possibly explains the highest contribution of tourism growth from table V as well. Consequently, the impacts of disasters on emerging economies are expected to be at a different level than those on advanced and low-income economies.

5. CONCLUSION

The COVID-19 outbreak, together with the economic crisis that followed, has been one of the most impactful events of modern times. Almost 2 years after the first case in Wuhan, the first calculations and conclusions can already be made. However, with evidence of global warming causing these pandemics outbreaks to happen more frequently in the future, it is important to gain more knowledge of the impact of different types of disasters on all industries. Literature shows that crises and tourism demand are

strongly correlated and have wide-reaching effects on many parts of life, including tourism activities. The negative relationship between disaster events and international tourist arrivals has been researched and confirmed many times, but they are not often compared to each other in a wider context. In this study, using a panel data approach, the impacts of financial crises, pandemics, terrorism, and environmental disasters on tourism demand are observed and compared. Additionally, the economic impact is estimated on both a global scale and different types of economies. This is done by employing a Two-Stage Least Squares method, with cross-sectional and time fixed effects. To estimate the economic impact of extra tourism demand, the Panel Least Squares estimator is employed, which outcomes are further analyzed by employing a Granger-Causality test. The outcomes suggest that globally, the most decisive role comes from terrorism and financial crises when making destination choices. The biggest role of the two is played by terrorism, which occurrence leads to a 40.1% decrease in tourist arrivals. Separated by regions, the results show only a significant negative effect of terrorism in the East Asia & Pacific area, and in the Latin America & Caribbean area. For Europe & Central Asia, financial crises is the only type of crises that is expected to decrease tourism demand. When divided in different levels of economic development, the most significant effects are coming from terrorism and financial crises as well. For the low-income countries, only terrorism is found to have a significant but very big influence on the number of tourist arrivals, which occurrence lowers 93.3%. The consequences of financial crises are found to be heterogenous on advanced and emerging economies. Where it affects the number of tourists in advanced economies in a negative way, it has positive effects on tourism demand in emerging economies. This heterogeneity continues to show off in the contribution of the number of inbound arrivals on the expenditures that are being made. The highest number is calculated for emerging economies, where tourist arrivals contribute to a 51.5% increase in expenditures. These findings are supported by the Granger-causality test, which verifies the theory around the economic-driven tourism growth within emerging economies, and thereby the incentive to compare the effects of different kinds of disasters on a bigger scale.

It is not an easy task for policy makers to avoid the permanent losses that can be caused by crises, such as the Covid-19 outbreak. Different types of economies benefit

from different kinds of policy making, and it is important to identify these differences. In this way, more personalized decisions can be made to accelerate the recovery and reconstruction of all affected countries.

6. DISCUSSION

6.1 Limitations

The research has several limitations, starting with the data collection. Because of the use of dummy variables and the lack of variation that comes with it, it is difficult to make any short-term estimations. Additionally, since the data that is used here is provided on an annual basis, possible short-term effects are very likely to be under-estimated, or to be missed in general. Besides this shortcoming, a homogenization of each type of disaster is imposed in this study. By doing this, the assumption is made that a comparison can be made between the consequences of, for example, financial crises and terrorism attacks, and their effects on developed and less developed countries. This might not be the case, which is why the results obtained in this study should be considered as average responses.

6.2 Recommendations

For future research, it is recommended to further explore this matter and investigate if the effects of the different disasters are homogenous and next to that, if differences among countries in reference to their level of development exist. It might be useful to further investigate the expected economic impact of extra tourist arrivals for the two situations: when a crisis does or does not occur, and if this depends on the type of economy. Additionally, it would be interesting to search more for the dynamic impact of such exogenous shocks. An Autoregressive Distributed Lag model could be employed to estimate the long-run elasticities of the tourism demand and to measure the speed of adjustment to restore the long-run equilibrium of the considered model. In this way, the tourism flows and their responses to shocks can be mapped even better and the effects of events like the current Covid-19 crisis can be estimated sooner.

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APPENDIX A: VARIABLES

A.1. Overview

In the Table VIII below, an overview is shown of the countries (coded by ISO) that are used in the data analysis, categorized by their region and income group.

TABLE VIII

OVERVIEW OF COUNTRIES, DIVIDED IN REGIONS AND ECONOMY LEVELS

Country name	Country Code	Region	Level of economy
Albania	ALB	Europe & Central Asia	Emerging Economies
Algeria	DZA	Middle East & North Africa	Low-Income Economies
Antigua and Barbuda	ATG	Latin America & Caribbean	Advanced Economies
Argentina	ARG	Latin America & Caribbean	Emerging Economies
Armenia	ARM	Europe & Central Asia	Emerging Economies
Australia	AUS	East Asia & Pacific	Advanced Economies
Austria	AUT	Europe & Central Asia	Advanced Economies
Azerbaijan	AZE	Europe & Central Asia	Emerging Economies
Bahamas, The	BHS	Latin America & Caribbean	Advanced Economies
Bangladesh	BGD	South Asia	Low-Income Economies
Barbados	BRB	Latin America & Caribbean	Advanced Economies
Belarus	BLR	Europe & Central Asia	Emerging Economies
Belgium	BEL	Europe & Central Asia	Advanced Economies
Belize	BLZ	Latin America & Caribbean	Low-Income Economies
Bermuda	BMU	North America	Advanced Economies
Bhutan	BTN	South Asia	Low-Income Economies
Bolivia	BOL	Latin America & Caribbean	Low -ncome Economies
Bosnia and Herzegovina	BIH	Europe & Central Asia	Emerging Economies
Botswana	BWA	Sub-Saharan Africa	Emerging Economies
Brazil	BRA	Latin America & Caribbean	Emerging Economies
Brunei Darussalam	BRN	East Asia & Pacific	Advanced Economies
Bulgaria	BGR	Europe & Central Asia	Emerging Economies
Burkina Faso	BFA	Sub-Saharan Africa	Low-Income Economies
Burundi	BDI	Sub-Saharan Africa	Low-Income Economies
Cabo Verde	CPV	Sub-Saharan Africa	Low-Income Economies
Cambodia	KHM	East Asia & Pacific	Low-Income Economies
Cameroon	CMR	Sub-Saharan Africa	Low-Income Economies
Canada	CAN	North America	Advanced Economies
Chile	CHL	Latin America & Caribbean	Advanced Economies
China	CHN	East Asia & Pacific	Emerging Economies

Colombia	COL	Latin America & Caribbean	Emerging Economies
Costa Rica	CRI	Latin America & Caribbean	Emerging Economies
Croatia	HRV	Europe & Central Asia	Advanced Economies
Cuba	CUB	Latin America & Caribbean	Emerging Economies
Cyprus	CYP	Europe & Central Asia	Advanced Economies
Czech Republic	CZE	Europe & Central Asia	Advanced Economies
Denmark	DNK	Europe & Central Asia	Advanced Economies
Dominican Republic	DOM	Latin America & Caribbean	Emerging Economies
Ecuador	ECU	Latin America & Caribbean	Emerging Economies
Egypt, Arab Rep.	EGY	Middle East & North Africa	Low-Income Economies
El Salvador	SLV	Latin America & Caribbean	Low-Income Economies
Fiji	FJI	East Asia & Pacific	Emerging Economies
Finland	FIN	Europe & Central Asia	Advanced Economies
France	FRA	Europe & Central Asia	Advanced Economies
Georgia	GEO	Europe & Central Asia	Emerging Economies
Germany	DEU	Europe & Central Asia	Advanced Economies
Ghana	GHA	Sub-Saharan Africa	Low-Income Economies
Greece	GRC	Europe & Central Asia	Advanced Economies
Grenada	GRD	Latin America & Caribbean	Emerging Economies
Guatemala	GTM	Latin America & Caribbean	Emerging Economies
Guinea-Bissau	GNB	Sub-Saharan Africa	Low-Income Economies
Guyana	GUY	Latin America & Caribbean	Emerging Economies
Haiti	HTI	Latin America & Caribbean	Low-Income Economies
Honduras	HND	Latin America & Caribbean	Low-Income Economies
Hong Kong SAR, China	HKG	East Asia & Pacific	Advanced Economies
Hungary	HUN	Europe & Central Asia	Advanced Economies
Iceland	ISL	Europe & Central Asia	Advanced Economies
India	IND	South Asia	Low-Income Economies
Indonesia	IDN	East Asia & Pacific	Low-Income Economies
Iran, Islamic Rep.	IRN	Middle East & North Africa	Low-Income Economies
Iraq	IRQ	Middle East & North Africa	Emerging Economies
Ireland	IRL	Europe & Central Asia	Advanced Economies
Israel	ISR	Middle East & North Africa	Advanced Economies
Italy	ITA	Europe & Central Asia	Advanced Economies
Jamaica	JAM	Latin America & Caribbean	Emerging Economies
Japan	JPN	East Asia & Pacific	Advanced Economies
Jordan	JOR	Middle East & North Africa	Emerging Economies
Kazakhstan	KAZ	Europe & Central Asia	Emerging Economies
Kenya	KEN	Sub-Saharan Africa	Low-Income Economies
Kiribati	KIR	East Asia & Pacific	Low-Income Economies
Korea, Rep.	KOR	East Asia & Pacific	Advanced Economies

Kuwait	KWT	Middle East & North Africa	Advanced Economies
Kyrgyz Republic	KGZ	Europe & Central Asia	Low-Income Economies
Latvia	LVA	Europe & Central Asia	Advanced Economies
Lebanon	LBN	Middle East & North Africa	Emerging Economies
Lesotho	LSO	Sub-Saharan Africa	Low-Income Economies
Lithuania	LTU	Europe & Central Asia	Advanced Economies
Luxembourg	LUX	Europe & Central Asia	Advanced Economies
Macao SAR, China	MAC	East Asia & Pacific	Advanced Economies
Malawi	MWI	Sub-Saharan Africa	Low-Income Economies
Malaysia	MYS	East Asia & Pacific	Emerging Economies
Maldives	MDV	South Asia	Emerging Economies
Mauritius	MUS	Sub-Saharan Africa	Emerging Economies
Mexico	MEX	Latin America & Caribbean	Emerging Economies
Moldova	MDA	Europe & Central Asia	Emerging Economies
Mongolia	MNG	East Asia & Pacific	Low-Income Economies
Montenegro	MNE	Europe & Central Asia	Emerging Economies
Morocco	MAR	Middle East & North Africa	Low-Income Economies
Mozambique	MOZ	Sub-Saharan Africa	Low-Income Economies
Myanmar	MMR	East Asia & Pacific	Low-Income Economies
Namibia	NAM	Sub-Saharan Africa	Emerging Economies
Nepal	NPL	South Asia	Low-Income Economies
Netherlands	NLD	Europe & Central Asia	Advanced Economies
New Zealand	NZL	East Asia & Pacific	Advanced Economies
Nicaragua	NIC	Latin America & Caribbean	Low-Income Economies
North Macedonia	MKD	Europe & Central Asia	Emerging Economies
Norway	NOR	Europe & Central Asia	Advanced Economies
Oman	OMN	Middle East & North Africa	Advanced Economies
Pakistan	PAK	South Asia	Low Income Economies
Panama	PAN	Latin America & Caribbean	Emerging Economies
Papua New Guinea	PNG	East Asia & Pacific	Low Income Economies
Paraguay	PRY	Latin America & Caribbean	Emerging Economies
Peru	PER	Latin America & Caribbean	Emerging Economies
Philippines	PHL	East Asia & Pacific	Low Income Economies
Poland	POL	Europe & Central Asia	Advanced Economies
Portugal	PRT	Europe & Central Asia	Advanced Economies
Puerto Rico	PRI	Latin America & Caribbean	Advanced Economies
Qatar	QAT	Middle East & North Africa	Advanced Economies
Romania	ROU	Europe & Central Asia	Emerging Economies
Russian Federation	RUS	Europe & Central Asia	Emerging Economies
Rwanda	RWA	Sub-Saharan Africa	Low Income Economies
São Tomé and Principe	STP	Sub-Saharan Africa	Low Income Economies

Saudi Arabia	SAU	Middle East & North Africa	Advanced Economies
Serbia	SRB	Europe & Central Asia	Emerging Economies
Seychelles	SYC	Sub-Saharan Africa	Advanced Economies
Sierra Leone	SLE	Sub-Saharan Africa	Low Income Economies
Singapore	SGP	East Asia & Pacific	Advanced Economies
Slovenia	SVN	Europe & Central Asia	Advanced Economies
Solomon Islands	SLB	East Asia & Pacific	Low Income Economies
South Africa	ZAF	Sub-Saharan Africa	Emerging Economies
Spain	ESP	Europe & Central Asia	Advanced Economies
Sri Lanka	LKA	South Asia	Low Income Economies
St. Lucia	LCA	Latin America & Caribbean	Emerging Economies
St. Vincent and the Grenadines	VCT	Latin America & Caribbean	Emerging Economies
Suriname	SUR	Latin America & Caribbean	Emerging Economies
Sweden	SWE	Europe & Central Asia	Advanced Economies
Switzerland	CHE	Europe & Central Asia	Advanced Economies
Syrian Arab Republic	SYR	Middle East & North Africa	Low Income Economies
Tajikistan	TJK	Europe & Central Asia	Low Income Economies
Tanzania	TZA	Sub-Saharan Africa	Low Income Economies
Thailand	THA	East Asia & Pacific	Emerging Economies
Timor-Leste	TLS	East Asia & Pacific	Low Income Economies
Tonga	TON	East Asia & Pacific	Emerging Economies
Trinidad and Tobago	TTO	Latin America & Caribbean	Advanced Economies
Tunisia	TUN	Middle East & North Africa	Low Income Economies
Turkey	TUR	Europe & Central Asia	Emerging Economies
Turkmenistan	TKM	Europe & Central Asia	Emerging Economies
Uganda	UGA	Sub-Saharan Africa	Low Income Economies
Ukraine	UKR	Europe & Central Asia	Low Income Economies
United Arab Emirates	ARE	Middle East & North Africa	Advanced Economies
United Kingdom	GBR	Europe & Central Asia	Advanced Economies
United States	USA	North America	Advanced Economies
Uruguay	URY	Latin America & Caribbean	Advanced Economies
Uzbekistan	UZB	Europe & Central Asia	Low Income Economies
Venezuela, RB	VEN	Latin America & Caribbean	
Vietnam	VNM	East Asia & Pacific	Low Income Economies
Zambia	ZMB	Sub-Saharan Africa	Low Income Economies
Zimbabwe	ZWE	Sub-Saharan Africa	Low Income Economies

A.2 Descriptive statistics of the variables.

The descriptive statistics for all variables are shown in Table IX below.

TABLE IX

DESCRIPTIVE STATISTICS

Variable	Obs	Mean	SD	Min	Max
$LnTou_{it}$	3080	14.476	1.970	6.551	19.150
$LnGDP_{it}$	3080	24.215	2.345	17.960	30.604
$LnPop_{it}$	3080	15.802	1.991	11.032	21.050
$LnLifeExp_{it}$	3080	4.261	0.125	3.752	4.439
WHS_{it}	3080	5.423	8.098	0.000	52.000
$Crime_{it}$	3080	6.737	11.471	0.000	105.231
$Pandemics_{it}$	3080	0.104	0.306	0.000	1.000
$Terrorism_{it}$	3080	0.473	0.499	0.000	1.000
$Natural\ disaster_{it}$	3080	0.473	0.499	0.000	1.000
$Financial\ Crisis_{it}$	3080	0.0844	0.278	0.000	1.000

A.3. Unit Root Test

Before making the estimations, a stationarity and co-integration analysis is implemented. The objective of this is to investigate the variable properties to help establish a long-run relationship between them (De Simone et al., 2018). The tests used for the unit root test are the LLC test (Levin et al., 2002), the ADF Fisher $\chi 2$ (ADF) and the Fisher $\chi 2$ (PP). For all variables, both the level and first difference unit root are estimated. The results for these three tests are shown in Table X below.

TABLE X

PANEL UNIT ROOT TEST

Variable	LLC	ADF	PP
$LnTou_{it}$	-2.638***	235.784	360.525***
$\Delta LnTou_{it}$	-20.741***	1036.150***	1733.690***
$LnGDP_{it}$	-3.039 ***	175.994	209.137
$\Delta LnGDP_{it}$	-20.859***	876.773***	1321.720***
$LnPop_{it}$	0.274	325.870	2467.950***
$\Delta LnPop_{it}$	-21.156***	1759.410***	502.632***
$LnLifeExp_{it}$	-46.819***	2902.760***	1768.740***
$\Delta LnLifeExp_{it}$	-36.031***	1938.260***	1135.390***
WHS_{it}	-4.859***	213.608	356.418***
ΔWHS_{it}	-9.823***	367.141***	709.917***
$Crime_{it}$	-4.033***	368.305***	540.938***
$\Delta Crime_{it}$	-21.438***	1332.860***	3867.710***
$Pandemics_{it}$	2.502	99.818**	207.207***
$\Delta Pandemics_{it}$	-15.331***	536.446***	2497.77***
$Environmental\ disasters_{it}$	-9.462***	565.218***	1203.400***
$\Delta Environmental\ disasters_{it}$	-27.471***	1490.040***	10399.000***
$Terrorism_{it}$	-9.074***	493.156***	923.680***
$\Delta Terrorism_{it}$	-22.119***	1250.070***	6601.430***
$Financial\ crises_{it}$	-22.362***	192.739***	309.043***
$\Delta Financial\ crises_{it}$	-18.084***	558.585***	2603.310***

Here the p-values are given by **p<0.05, ***p<0.01.

The null hypothesis of non-stationarity can for almost all variables be rejected for the level. Only for the ADF statistic of *LnTou* and *LnGDP, LnPop*, and *WHS*, where also the PP statistic can also not reject the null hypothesis for the first two. Besides that, the LLC statistic is not significant for *LnPop*. For *Pandemics* the LLC statistic is not significant.

APPENDIX B: THE REGRESSION

B.1. Model estimation

In this part of the appendix the model explanation will be shown. At first the Panel Least Squares method was used to identify the nature of this regression. The results are shown in table 12, where the Panel Least Squares is done with none, fixed, and random effects in the cross section

B.1.1. Random or Fixed effects

The regression equation for the random effects model is as follows:

(3) $LnTou_{it} = \beta_0 + \beta_1 LnGDP_{it} + \beta_2 LnPop_{it} + \beta_3 LnLifeExp_{it} + \beta_4 WHS_{it} + \beta_5 Homicides_{it} + \lambda_{it} + u_{it}$

Where, the error term ε consists of the randomly drawn λ_{it} and u_{it}.

The Fixed Effects model is given in Equation 4 below:

(4) $LnTou_{it} = \beta_0 + \beta_1 LnGDP_{it} + \beta_2 LnPop_{it} + \beta_3 LnLifeExp_{it} + \beta_4 WHS_{it} + \beta_5 Homicides_{it} + \alpha_{it} + \upsilon_{it}$

Here, the α_{it} are the country and time specific intercepts that capture heterogeneities across countries. The results for both models, together with the no-effects model, are shown in Table XI.

TABLE XI

PANEL LEAST SQUARES MODEL

Variable	None	Random	Fixed
Constant	-6.794***	-18.752***	-23.552***
	(-6.981)	(-19.276)	(-18.993)
$LnGDP_{it}$	0.570***	0.260***	0.245***
	(28.372)	(18.253)	(16.748)
$LnPop_{it}$	-0.058***	0.444***	1.0348***
	(-2.725)	(10.490)	(10.397)
$LnLifeExp_{it}$	1.913***	4.668***	3.702***
	(7.817)	(20.518)	(13.353)
WHS_{it}	0.038***	-0.003	-0.005
	(10.895)	(-0.875)	(-1.144)
$Crime_{it}$	0.003*	-0.002	-0.004***
	(1.758)	(-1.306)	(-2.413)
Adjusted R squared	0.655	0.452	0.955
Kleibergen–Paap F- statistic	1169.175	507.668	428.573

Note: Robust Standard Errors in parentheses. Here the p-values are given by *p<0.1, ***p<0.01.

B.1.2. Hausman Test

To estimate which model suits best, a Hausman-Test is. The null hypothesis for this model is that the random effects model is preferred over the fixed model (and there is no correlation between the unique errors and the regressors in the model). The alternative hypothesis is that the fixed effects model is the best fit. The results give a Chi-squared statistic of 82.906 and a p-value close to zero, which means that the null hypothesis can be rejected, and the fixed effects model is preferred here. The outcomes for this test are shown in Table XII.

TABLE XII

HAUSMAN-TEST FOR RANDOM EFFECTS.

	Chi-squared statistic
Cross-section random	82.906***

Here the p-value is given by ***p<0.01.

Because of previous results, the fixed effects model will be used as the baseline model. The regression for this model is as follows:

$$LnTou_{it} = \beta_0 + \beta_1 LnGDP_{it} + \beta_2 LnPop_{it} + \beta_3 LnLifeExp_{it} + \beta_4 WHS_{it} + \beta_5 Homicides_{it} + \alpha_{it} + \upsilon_{it} \quad (4)$$

Here, the α_{it} are the country and time specific intercepts that capture heterogeneities across countries.

B.2 Granger Causality

In Table XIII, the results of the Granger Causality test are displayed. This test estimates the direction of the relationship between two variables in a time series model. In this study, the relationship between the dependent variable for tourist arrivals and all independent variables is tested. The statistics show the coefficient in which the independent variable Granger-causes the dependent variable, and the other way around.

TABLE XIII

GRANGER CAUSALITY TESTS

Dependent variable	Statistic Dependent variable → LnTou	Statistic LnTou → Dependent variable
LnGDP	4.426**	34.241***
LnPop	11.407***	3.507**
LnLifeExp	1.228	2.929*
WHS	2.375*	7.455***
Crime	0.504	1.385
Pandemics	2.553*	12.677***
EnDisaster	0.489	5.467***
Terrorism	2.527*	14.209***
EcCrisis	0.452	2.002

Here the p-values are given by *p<0.1, **p<0.05, and ***p<0.01.

The table shows what was already expected in literature: *LnGDP* and *LnTou* show a two-way Granger causality. However, this is not the only independent variable for which this happens. *LnPop*, *LnLifeExp*, *WHS*, *Pandemics*, and *Terrorism* show this type of

Granger causality as well for at least 10% significance. As said before, this could be causing endogeneity problems in the empirical model.