Research Article

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How does the economy affect a religious phenomenon? A panel approach to international pilgrimages to the Shrine of Fátima

Abstract: This paper investigates the economic determinants of Catholic pilgrimages to the Shrine of Fatima using a panel data set with annual observations from 2008 to 2017 from 29 origin countries. The Panel Autoregressive Distributed Lag, using the estimator of Driscoll and Kraay (1998), was employed to examine short- and long-run impacts. The results reveal that, in the short run, GDP *per capita*, the exchange rate and overall international departures positively impact the number of pilgrims. In the long run, international departures and GDP *per capita* cause positive impacts, while unemployment shows a negative impact. All effects are statistically significant. Besides shedding light on the relationship between economic determinants and religious phenomena, this paper is valuable to national and local policymakers, shrine managers and regional entrepreneurs. It is a tool for everyone who must be aware of the main determinants of the number of pilgrims, to plan joint measures that may generate more significant opportunities to attract pilgrims, crucial to supporting the local economy and in addition to being an important contribution to the economics of religion literature, indicating contemporary impacts on a religious phenomenon.

1 Introduction

The Shrine of Fátima (Portugal) is one of the leading destinations for Catholic pilgrimages (Belucio & Fuinhas, 2019). The number of pilgrims and tourists is essential for the sanctuary city and the local economy (Fuinhas et al., 2017a). Marian pilgrimages are important for believers who profess the Catholic faith. The phenomenon attracts thousands of national and international visitors every year. Shrines can be considered true works of art, so they appeal to lovers of architecture, engineering, arts, and the like, in addition to the pilgrims.

There are many ways the economy and religion interact (e.g., Belucio & Fuinhas, 2019). For example, Di Giovine (2020) shows the shrines' importance as economic drivers. For this reason, our research question is: Does the economic performance of countries significantly influence the religious phenomena of Marian pilgrimages?

The general objective of this study is to assess the impact of the economic situation in the pilgrim's origin country on the number of pilgrims to the Shrine of Fátima. The studies by Mourao (2012) and McCleary & Barro (2006) inspired further research on the positive and negative relationships of economic determinants on pilgrimages. In this paper, we address the particular phenomenon of the Marian pilgrimage in Fátima.

To verify this hypothesis, from the point of view of the economic sciences, two important economic variables are employed, reflecting the overall economic conditions in the countries of origin of the pilgrims: the gross domestic product *per capita* (GDPpc) and the unemployment rate

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(UNE). Furthermore, in constructing the panel autoregressive distributed lag (ARDL), two other variables were added, the number of international departures and the real effective exchange rates. The sample in this study includes annual statistical data from 2008 to 2017. It was possible to consider 29 countries of origin of pilgrims in this study.

The econometric results evidence a positive short-term impact of international departures, GDPpc, and the exchange rate on the number of international pilgrims to the Shrine of Fátima. In the long-term, international departures and GDPpc maintain a positive and statistically siignificant impact on the number of pilgrims, whilst unemployment has a long-term negative effect.

The introduction makes up the first section of this study. The following section presents the literature review. The methodology, the statistical data and the selected economic model are then presented. The following sections present and discuss the results. The last section reports the main conclusions and provides suggestions for a follow-up on this research.

2 Literature review

Some relevant aspects of the relationship between the economic sciences and tourism determinants will be presented first. Then, the debate on the economic determinants of religious tourism and pilgrimages will be exposed. Indeed, the contemporaneous literature names the economy as one area that deals with the religion-tourism nexus (Collins-Kreiner, 2020). Raj and Griffin (2020) reveal that host countries and communities currently benefit from religious tourism. The authors cite examples of these flows as a means of sociocultural exchange, regional development, economic development, and environmental improvements (Raj & Griffin, 2020).

According to McCleary & Barro (2006), general economic development – represented by GDPpc – tends to reduce religiosity in the secularisation view. Instrumental estimates suggest that this link reflects the causality of economic development to religiosity (McCleary & Barro, 2006). Belucio & Fuinhas (2019) show a positive impact of the pilgrimage to Fátima (Portugal) on GDP.

Mourao (2012) investigated how economic dimensions change the focus of prayers and graces published in religious bulletins. The author found a relationship between published graces and the economic cycle. The main findings are that a higher UNE, a lower real GDP growth rate and election periods lead to a more significant number of graces focused on economic issues (Mourao, 2012).

Religious-motivated travel is one of the oldest forms of global mobility (Belucio & Fuinhas, 2019). Although economic determinants are related to religious tourism (Belucio & Fuinhas 2019), analysing them and recognising their value to societies is vital. UNWTO (2014) states that between 300 and 330 million tourists visit prominent religious places worldwide annually, making approximately 600 million national and international religious trips globally, 40% of which in Europe. Around 1.5 billion international tourists were registered globally in 2019, a 4% increase over the previous year (UNWTO, 2020).

In terms of the impact of religious tourism, Graave et al. (2017) estimated that in 2010, pilgrimage expenditures in Santiago de Compostela created between €59.750 million and €99.575 million in gross value added and between 1,362 and 2,162 jobs in Galicia, Spain. This data corroborates the findings of Vijayanand (2012), showing the several positive impacts of pilgrimages, namely, job opportunities. Local people are employed in different tourism industry sectors, creating opportunities and new fields for commercial activities.

Terzidou et al. (2008) show that religious tourism positively impacts quality of life and infrastructure. On the other hand, Vijayanand (2012) argues that tourist spending provides the necessary income for preserving and managing places of attraction. Such spending also becomes an important source of revenue for municipal councils, from parking, tourist taxes and the like (Vijayanand, 2012).

The pilgrimage to Mecca is one of the largest in the world. Millions of Muslim worshipers annually visit Mecca in Saudi Arabia to perform Hajj (Abonomi et al., 2022). Year after year, pilgrimages to Mecca have positively and significantly impacted the Kingdom of Saudi Arabia's economy (Aktas & Ekin, 2007). The kingdom aims to earn US$13.32 billion in revenue from the Hajj alone by 2030 (Reuters, 2023). The motivations and meanings a traveller assigns to his journey can be understood as the parameter to define what is or is not a pilgrimage (Lloyd, 2015; Margry, 2009). Every pilgrim is a religious tourist, but not all religious tourists are pilgrims. Steil (2019) states that the term *pilgrim* rarely appears in the speech of visitors and tourism agents. However, many people who participate in the visits experience it as an experience of the sacred. Belucio & Fuinhas (2019) emphasise that both believers and unbelievers can make tourist-religious visits.

Tourism and religious tourism come into this debate because they can become an important agent responsible for generating wealth for countries. Tourism-led growth consists of four hypotheses (see, Sokhanvar et al., 2018).

Around the world, countries have a specific interest in validating a growth hypothesis, that is, tourism exports generate economic growth.

The literature supports the tourism-led growth hypotheses in Portugal (Bento, 2016; Proença & Soukiazis, 2008), the host of the Shrine of Fátima. Andraz & Rodrigues' (2016) results show that periods of economic recession dictate tourism contractions, while economic expansions are reflected in the persistent increases in tourist flows in Portugal. Some studies about tourism-led growth analyse countries individually, while others address groups of countries using panel data (e.g., Balsalobre-Lorente et al., 2020; Proença & Soukiazis, 2008; Shahzad et al., 2017; Sokhanvar et al., 2018).

All countries share a common concern: the search for sustained economic growth. Economic growth demonstrates the countries' productive capacity. That is how states can increase the supply of jobs and improve essential services such as education, health, safety and transport. Besides, growth is responsible for increasing the supply of goods and services for consumption, allows for better income distribution, the fight against poverty, also potentially providing benefits to the environment due to better technologies and infrastructure.

The case of Portugal stands out and receives important international distinctions in the tourism sector (e.g., Belucio et al., 2020). Nevertheless, due to the impact of the COVID-19 pandemic, the country's tourism sector has suffered a significant setback. The shock caused by the crisis led the country to campaign for a temporary break in tourism (e.g., Visit Portugal, 2020). Pilgrimages and mass meetings have been suspended (Raj & Griffin, 2020). Like other Catholic shrines worldwide, the Shrine of Fátima was closed (Di Giovine, 2020). The literature indicates that the Catholic Church owns much of Portuguese cultural heritage (Falcão, 2002).

Raj & Griffin (2020) show that, in general, the COVID-19 pandemic was devastating for the religious tourism industry. Tourism flows from different origin markets to Portugal reveal different performances that depend on each country's economic and financial environments (Andraz & Rodrigues, 2016). Figure 1 presents the number of international arrivals and departures from Portugal. The data were selected by the World Bank (2020), and after the analysis, it is possible to understand the behaviour of the tourism sector in this southern European country.

Portugal's Marian religious tourism is one of the most important in the world, with the sanctuary city of Fátima being the focal attraction site. Some studies have shown the relationship between economic determinants and Marian religious tourism (Belucio et al., 2019; Belucio &
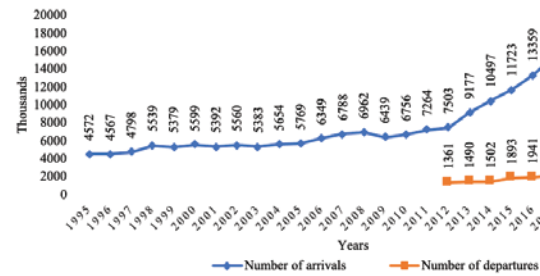

Figure 1: Portuguese international tourism
Source: World Bank (2020)

Fuinhas, 2019). Lisbon, Portugal's capital, will host the next World Youth Day (WYD) in 2023. After prior candidature, the country was chosen as the venue for this event in 2019. This event was initially scheduled for 2022 but was postponed due to the COVID-19 pandemic, and thousands of pilgrims will participate. Considering its importance, the city of Fátima is a natural candidate to receive many pilgrims during the event.

Due to its enormous cultural-religious importance, the pilgrimage has become, in recent years, one of the main areas for interdisciplinary research of in the field of study of religion (Rodrigues, 2019). However, pilgrimage practice and research have changed considerably in recent decades (Thomas et al., 2018).

For Collins-Kreiner (2010), the pilgrimage is not a static phenomenon. On the contrary, it is always in a state of change and dependent on the transformations of society. Reader (2007) points to the growth of pilgrimages, and Collins-Kreiner (2020) shows the increase in scientific research on religious tourism. Some authors label the phenomenon 'slow tourism' (e.g., Kato & Progano, 2017), that is, a method of travelling that relates the tourist with the local population, nature, local culture, gastronomy and others.

For Korstanje (2020), religious tourism represents the most important economic resource for many sacred spaces. In the United States, it is estimated that 25% of travellers are interested in pilgrimages or faith-based tourism (Vijayanand, 2012). Three elements make up a pilgrimage route: the path, the motivation and the destination (Lois-González & Santos, 2015). For centuries, Marian Apparitions worldwide have motivated displacement of most believers to move to sacred places (Fuinhas et al., 2017a).

Ambrosio & Pereira (2007) briefly describe four cases of Marian Apparitions, all places of current pilgrimage, namely: Banneux-Belgium (1933), Fátima-Portugal (1917), Knock-Ireland (1879) and Lourdes-France (1958).

Several studies related to Marian Catholic pilgrimages also appear in the literature (Alvarado-Sizzo et al., 2017; Belucio & Fuinhas, 2019; Fuinhas et al., 2017a; Rodrigues, 2019; Thomas et al., 2018; Vukonić, 1992). Other Christian-Catholics pilgrimages are discussed, for example, Santiago de Compostela (Blom et al., 2016) or the WYD (Gonzalez et al., 2019). McNeill (2003) mentions that the site of the Vatican has been increasingly used to celebrate Catholicism through mass meetings and pilgrimages.

People who have lived and testified religious experiences motivate millions of people to make pilgrimages, for example, to Lourdes (France) with the 'Echoes of Bernadette' (Thomas et al., 2018); Fátima (Portugal) with Sister Lúcia's narrative (Kondor & Alonso, 2007) and the Holy Land (João Paulo II, 1999). As an institution, the Catholic Church motivates pilgrimages (Liutikas, 2015). Each pilgrim contributes directly or indirectly to the sanctuary city's local economy; therefore, encouraging this tourism is important for the economy.

For Catholics, the importance of devotion and visits to the Marian shrines is unquestionable (Belucio, 2018). However, mainly for economic reasons, not everyone can get access to pilgrimage practices. Participation in the WYD, the largest Catholic pilgrimage for young people, is an example. Because of their high cost, young people from poor or developing countries often have little access to tourism goods and services. Furthermore, these countries commonly have a high rate of unemployment, which becomes another barrier to accessing pilgrimage. Gonzalez et al. (2019) bring forward many details about the pilgrimage of young Catholics. The authors discuss the target audience's economic situation and reveal their limited financial resources for travelling abroad.

For Korstanje (2020), experts agree that pilgrimages and religious tourism will play an increasing role in the configuration of developing economies in the future. Nevertheless, like any other activity that moves the economy, the phenomenon of pilgrimage can be affected by several positive or negative drivers. An example of a negative driver is the pandemic caused by COVID-19 that has shaken religious and general tourism worldwide, mainly due to measures to close borders and determination of lockdown in several countries worldwide. For this reason, for sustainable economic development, the various stakeholders of religious tourism must be prepared for different economic situations.

Belucio & Fuinhas (2019) show that the weather and economic development impact the religious tourist visits to Fátima. Belucio et al. (2021), studying the Shrine of Aparecida (Brazil), show results corroborating the previous findings in a different context. The authors show the positive impact of the population's average income and climatic factors on the number of visits to the shrine.

Grim & Grim (2016), studying the contributions of religion to American society, emphasise that several aspects of the crimes committed by religious people (official members) undermine the positive contributions made by religious institutions and adherents (of religion). For this reason, human resources are essential for maintaining sacred places and attracting pilgrims and visitors.

A holistic view of the interdisciplinarity behind the phenomenon of the pilgrimage is therefore required. Religious studies and research have gained a lot of interest and attention from researchers, policymakers, and practitioners over the last few years. However, the socio-economic impacts have not been fully explored (Álvarez-García et al., 2018). The vast and growing literature on religious tourism confirms the relevance of the phenomenon. Collins-Kreiner (2020) has described numerous cases of religious tourism in the literature. However, global studies by region, religion or type of shrine are still necessary.

Augenblick et al. (2016) remember that an essential activity for the religious economy is understanding the faith better. Consequently, analysing the economic determinants of one of the oldest faith practices in the world and collaborating to bring new insights into the debate is fundamental. Moreover, the economic sciences commonly apply panel data methodologies for macroeconomic tourism studies: ARDL (Yazdi & Khanalizadeh, 2017), generalized method of moments (GMM) (Balsalobre-Lorente et al., 2020), nonlinear (Po & Huang, 2008; Dumitrescu & Hurlin, 2012) and the like.

The economic sciences clarify that a particular phenomenon is often not finely captured by studying just one country. However, this does not mean that the phenomenon does not exist since the effect is often present and statistically significant by building a homogeneous panel. For this reason, building a panel data set helps to verify how the countries' economic performance influences religious tourism to Fátima, the central objective defined for this study.

3 Data and Methodology

This section will be divided into two sub-sections. The first will be devoted to presenting secondary statistical data, describing how they were obtained, and presenting their statistical nature, which can be obtained through various tests and statistics. Next, the econometric model that best deals with the statistical characteristics of our data will

be presented, and its mathematical equation with the arrangement of the variables to be analysed.

3.1 Data

For this study, the period between 2008 and 2017, including 29 countries, was determined as the time horizon (the longest possible time horizon due to data limitations). The number of international pilgrims to the Shrine of Fátima by country was obtained directly on the Shrine of Fátima web page (https://www.fatima.pt/pt/). The data contemplates a short time horizon. The variable PIL considers only those who previously registered as pilgrims. Foreign tourists who include a religious tour at the last minute in their plans but effectively comply with pilgrim precepts without declaring themselves to be one of them are not counted by the pilgrim statistics.

Figure 2 presents a compilation of statistics from the Shrine of Fátima, compiled by Belucio et al. (2020). In this figure, it is possible to see different types of visitors to the Shrine of Fátima between 2008 and 2018. Different types of pilgrims (national, international, and total) were highlighted. In addition, participants in private celebrations (such as christenings and weddings) are also featured. Unfortunately, the authors were not able to determine the total number of visitors.

Hereafter, we show three variables obtained from the World Bank statistical databases. First, the UNE (in % of the total labour force) is based on national estimates. As employment is usually considered one of the economic drivers of tourism, this variable has a potentially excellent explanatory power to explain the decision to consume tourism services. Second, GDPpc in constant local currency units allows for controlling for disparities in population growth between the countries (Fuinhas et al., 2017b) and allows for checking the evolution of the economic situation. Lastly, we use the number of departures
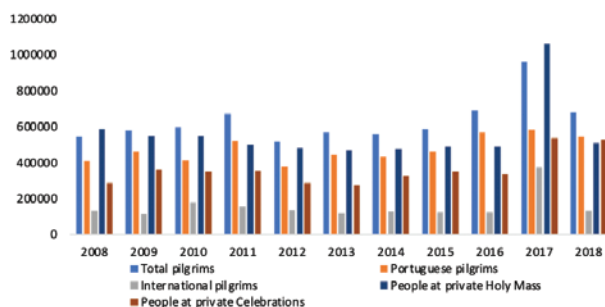

Figure 2: Official pilgrims
Source: Belucio et al. (2020)

(DEPA) to represent the weight of international tourism. This variable has not been transformed into per capita because the total DEPA reflects the real impact of the tourism flow. Relativising by population would generate a small amount of informational gain since the objective is to know the effect of the number of exits. Furthermore, it reveals each country's international tourism import behaviour. The World Bank (2020) defines this variable as the number of departures people make from their usual residence to any other country for purposes other than an activity remunerated in the country visited (World Bank, 2020).

The International Monetary Fund database was used to obtain the Real Effective Exchange Rate of pilgrims' countries of origin, based on the Consumer Price Index (EXC). The exchange rate is a measure of the value of a currency against a weighted average of several foreign currencies) divided by a price deflator or index of costs. An increase in the exchange rate implies that exports become more expensive and imports become cheaper. Therefore, our EXC variable measures the country's global competitiveness, an increase indicates a loss in trade competitiveness (International Monetary Fund, 2020).

The importance of the exchange rate for pilgrimages was detected by Belucio & Fuinhas (2019). In addition, it is a crucial variable for the entire tourism sector, having the power to restrict travel and/or pilgrimages, mainly when the tourist flow originates in countries with a devalued currency compared to that of the destination. Finally, the real effective exchange rate was used to disregard the inflationary effects of the countries. However, four countries did not have data available in the database. Therefore, we turned to the Federal Reserve Economic Data for these countries to balance the data panel, importing data for Slovenia, Indonesia, Peru and India.

Table 1 presents the descriptive statistics of the data mentioned above. There are 290 observations for the variables in level and 261 after taking the first differences (d). This fact confirms the balanced panel nature of our sample. In addition, mean, standard deviation, minimum and maximum values are presented. Descriptive statistics are essential for other researchers to extend the study developed here.

The first- and second-generation unit root tests were carried out, and the results are displayed in Table 2. They provide more information about the nature of the variables, namely, about their integration order. The integration order can vary widely according to the series, unit and time. Maddala & Wu's (1999) test of the first-generation and Pesaran's (2007) test of the second generation was applied with two different options: (i) in the presence of a

Table 1: Statistical description of the data

Variable	Obs.	Mean	Stand. dev.	Minimum	Maximum
pil	290	4307.65	9111.46	10	69540
gdppc	290	1927727	6393161	12323.84	37500000
depa	290	22400000	25500000	261000	143000000
une	290	8.12	5.14	0.29	27.33
exc	290	97.61	8.42	69.42	129.96
lpil	290	6.963	1.706	2.303	11.150
lgdppc	290	11.348	1.989	9.419	17.439
ldepa	290	16.315	1.230	12.472	18.779
dlpil	261	0.145	0.727	-1.901	3.203
dlgdppc	261	0.014	0.035	-0.155	0.215
dldepa	261	842058	2981744	-17200000	18400000
dune	261	0.068	1.146	-3.072	6.603
dexc	261	-0.798	5.086	-21.251	12.405

Notes: 'l' in front of the variables means that the value was transformed into a natural logarithm; Stand. Dev. denotes standard deviation; rates cannot be transformed into a natural logarithm due to statistical restrictions.

trend, which helps to capture long-term elements related to the time series; and (ii) without a trend. The variables are stationary in level or first difference, reflecting some form of stable equilibrium. The test results suggest two types of order of integration: I(0) e I(1). The ARDL model can appropriately handle cointegration and a mixture of variables of a different order of integration (i.e., I(0), I(1), and fractionally integrated, but not I(2); see, e.g., Santiago et al., 2020).

Multicollinearity is another problem that can make short- and long-term analysis unfeasible. This phenomenon occurs when independent variables have exact or approximately exact linear relationships. Therefore, we check the Variance Inflation Factor statistic, which provides important information about the accuracy of the regression coefficients. The results are within expectation, with an average of less than 10, confirming that our data set has no multicollinearity problem. More details are shown in Table 3.

Table 4 presents the correlation matrix and the cross-sectional dependence (CD) test. The matrix indicates statistically significant positive and negative correlations. It is common knowledge that the correlation matrix allows the evaluation of the statistical association between two variables. Variables with correlation values close to 1 or –1 are considered highly correlated. The negative sign means that when one variable increases, the other decreases. The positive sign indicates that the variables tend to have

the same directional behaviour. That is, they increase or decrease at the same time.

Regarding the CD test, the results show CD in all variables. According to Fuinhas et al. (2019), sectional dependence originates from spatial patterns of unobserved common factors and is sometimes present in panel data models. This phenomenon is especially problematic in the case of macro panels with very long time series. If this problem is not adequately controlled, biased estimates will likely be obtained (Fuinhas et al., 2019).

As mentioned, long periods exacerbate the potential occurrence of a panel with parameter slope heterogeneity and the presence of CD (Fuinhas et al., 2017b). Furthermore, the presence of CD shows evidence that countries share common shocks.

3.2 Econometric model

An unrestricted Error Correction Mechanism (ECM) of the ARDL model, developed by Pesaran & Shin (1999), was used to analyse the impact of the economic determinants on pilgrimages. The model decomposes the total effect of a variable into its short- and long-term components. The ECM dynamic form of the ARDL model, which decomposes the total effect into the short- and long-term, is used in this empirical analysis, following Equation 1:

Table 2: Panel unit root tests

Maddala & Wu (1999) Panel Unit Root test

Specification without trend				Specification with trend			
Variables	lags	Chi-Square	p-value	Variables	lags	Chi-Square	p-value
lper	0	72.878	0.090	lper	0	86.045	0.010
dlper	0	303.272	0.000	dlper	0	277.706	0.000
lgdppc	0	55.546	0.5670	lgdppc	0	455.452	0.000
dlgdppc	0	865.527	0.000	dlgdppc	0	681.756	0.000
une	0	101.813	0.000	une	0	370.916	0.000
dune	0	402.546	0.000	dune	0	273.373	0.000
exc	0	66.322	0.212	exc	0	124.349	0.000
dexc	0	318.098	0.000	dexc	0	225.599	0.002
ldepa	0	32.529	0.997	ldepa	0	112.73	0.000
dldepa	0	213.454	0.000	dldepa	0	239.402	0.000

Pesaran (2007) Panel Unit Root test (CIPS)

Specification without trend				Specification with trend			
Variables	lags	Zt-bar	p-value	Variables	lags	Zt-bar	p-value
lper	0	-1.436	0.075	lper	0	-2.196	0.014
dlper	0	-6.965	0.000	dlper	0	4.618	0.000
lgdppc	0	0.107	0.542	lgdppc	0	0.807	0.210
dlgdppc	0	-3.656	0.000	dlgdppc	0	1.535	0.062
une	0	-1.495	0.067	une	0	-2.037	0.021
dune	0	-5.126	0.000	dune	0	0.509	0.305
exc	0	-2.179	0.015	exc	0	0.323	0.627
dexc	0	-4.223	0.000	dexc	0	-2.978	0.001
ldepa	0	0.882	0.811	ldepa	0	2.059	0.980
dldepa	0	-1.653	0.049	dldepa	0	-1.559	0.060

Notes: *, *** denote statistical significance at the levels of 10% and 1%, respectively; Maddala & Wu (1999) Panel Unit Root test assumes the cross-sectional independence and H0: series in l(1). Pesaran (2007) Panel Unit Root Test (CIPS) assumes that cross-sectional dependence is in the form of a single unobserved common factor and H0: series is I(1)

Table 3: Variance inflation factor statistics

Variable	VIF		
Lgdppc	1.10		
Exc	1.09	Mean VIF	1.07
Une	1.06		
Ldepa	1.04		
Dlgdppc	1.60		
Dune	1.48	Mean VIF	1.33
Dldepa	1.17		
Dexc	1.08		

Note: Dependent variables are the number of pilgrims in the natural logarithm and the first difference, respectively.

$$LPIL_{it} = \alpha_{1i} + \delta_{1i}TREND + \beta_{1i1}LPIL_{it-1} + \beta_{1i2}LGDPPC_{it} + \beta_{1i3}LGDPPC_{it-1} + \beta_{1i4}UNE$$
$$+ \beta_{1i5}UNE_{it-1} + \beta_{1i6}LDEPA_{it} + \beta_{1i7}LDEPA_{it-1} + \beta_{1i8}TXCR_{it}$$
$$+ \beta_{1i9}TXCR_{it-1} + \varepsilon_{1it},$$

(1)

Where, α_{1i} denotes the intercept, δ_{1i} the trend, $\beta_{1i1}+ ... +\beta_{1i9}$ are the estimated coefficients and ε_{1it} is the error term. The subscripts "t" and "i" denote the time horizon and country, respectively.

To explain the dynamic relationships between our variables, we have reworked specification eight into the following Equation 2:

$$DLPIL_{it} = \alpha_{2i} + \beta_{2i1}DLGDPPC_{it} + \beta_{2i2}DUNE + \beta_{2i3}DLDEPA + \beta_{2i4}DTXCR_{it}$$
$$+ \gamma_{2i1}LPIL_{it-1} + \gamma_{2i2}LGDPPC_{it-1} + \gamma_{2i3}UNE_{it-1} + \gamma_{2i4}LDEPA_{it-1}$$
$$+ \gamma_{2i5}TXCR_{it-1} + \varepsilon_{2it}$$

(2)

Table 4: Correlation matrix and cross-sectional dependence (CD)

	Correlation matrix					Cross-sectional dependence			
	lpil	**lgdppc**	**Une**	**exc**	**ldepa**	**CD-test**	**pvalue**	**corr**	**abs(corr)**
lpil	1					29.27	0.000	0.459	0.500
lgdppc	-0.2629*	1				35.94	0.000	0.564	0.664
une	0.4568*	-0.1734*	1			11.35	0.000	0.178	0.498
exc	-0.0152	-0.2436*	-0.0496	1		13.83	0.000	0.217	0.575
ldepa	0.3892*	-0.0782	0.1281*	0.1287*	1	31.87	0.000	0.500	0.566
	dlpil	**dlgdppc**	**Dune**	**dexc**	**dldepa**				
dlpil	1					23.32	0.000	0.386	0.473
dlgdppc	0.2009*	1				28.16	0.000	0.466	0.541
dune	-0.2057*	-0.5664*	1			21.14	0.000	0.350	0.517
dexc	0.1472*	0.1586*	-0.1373*	1		5.60	0.000	0.093	0.403
dldepa	0.1574*	0.3093*	-0.1486*	0.2563*	1	8.19	0.000	0.135	0.305

Note: The CD test has N(0,1) distribution under H0: cross-sectional independence. * denotes statistical significance at 5%.

The ARDL model allows the interaction of the variables with different orders of integration, for example, I(0) and I(1), but excludes variables with a higher order of integration, for example, I(2). Driscoll & Kraay (1998) developed the fixed effects (FE-DK) estimator that deals robustly with the presence of heteroscedasticity, contemporaneous correlation, the autocorrelation of the first order and transversal dependency phenomena (e.g., Afonso et al., 2017). These characteristics are commonly found in panel data (e.g., Afonso et al., 2017; Fuinhas et al., 2017b).

The last characteristic required by the ARDL panel is the presence of fixed effects (FEs), which can be verified through the Hausman test. The test's null hypothesis is that the random effect (RE) model is appropriate. However, the REs are improper because, generally, the differences have a negative serial correlation, which may cause problems. Table 5 shows the test results.

After the test of FEs versus (vs.) REs had been carried out, the null hypothesis was rejected at the 1% significance level, supporting using a FE estimator through the verified two test options.

Three specification tests were applied (Table 6), providing robustness and confirming that the selected method handles the data characteristics well: (i) the modified Wald Test for the presence of heteroscedasticity; (ii) the Pesaran test for the presence of contemporaneous correlation; and (iii) the Wooldridge test for autocorrelation, to assess the presence of serial correlation in our model.

The specification tests show groupwise heteroskedasticity, serial correlation and CD in the model. After the results of these tests, the next stage was to estimate the model described in Equation 2. The estimators are capable of producing standard errors robust to the presence of the phenomena mentioned above.

Table 6: Specification tests

	Statistics	Probability
Modified Wald test	275.61	0.0000
Pesaran's test	19.945	0.0000
Wooldridge test	33.975	0.0000

Notes: H0 of Modified Wald test: homoscedasticity; H0 of Pesaran's test: residuals are not correlated and follow a normal distribution; and H0 of Wooldridge test: no first-order autocorrelation.

Table 5: Hausman test

FE vs. RE	FE vs. RE
Chi2(8) = 151.74***	99.99***
Default option by Stata	*Sigmamore option by Stata*

Notes: *** denotes significance at the 1% level.

4 Results

Table 7 shows the results of the FE and FE-DK estimators. The results are statistically significant at 1%, 5% or 10% levels, suggesting the presence of short-term impacts. Furthermore, by analysing the ECM (which has a negative value between 0 and –1), it is possible to estimate the long-term impacts.

Two dummy variables were generated for the Netherlands (2017) and Japan (2016) and included in the model (Table 7) to control the outlier into the residues of the estimation (Figure 3). In our residuals, the value for Japan is the lowest (–2.30) and for the Netherlands the highest (1.78), so we started by controlling these outliers, once the model balance was found, no other outliers were controlled. The Japanese people also occupy a prominent place in tourism in Portugal. Japan was responsible for more than 140,000 guests in 2017 (Statistics Portugal, 2018), 24% more than in 2016. There are 536 thousand Catholics in Japan (Vatican News, 2019), which is relatively low compared to its immense population. That is why attendance in Marian pilgrimages can be associated with the Apparitions Feast and possibly supported by the international Catholic community and the Catholic leadership in the country. Recently, Pope Francisco visited the country in his 32nd Apostolic Journey (Vatican News, 2019). Regarding the Netherlands dummy, there are shocks that occur in a period but can be reflected in a period immediately after, which is verified in this case, where in 2016, the odd number of pilgrims from the Netherlands (ten times higher than usual). Throughout the year, tourists from this

European country occupy more than 600,000 beds in the hotel sector in Portugal (Statistics Portugal, 2018).

Next, Table 8 shows short-term impacts, long-term impacts, and the adjustment speed of the model. As expected, the speed of adjustment model shows a coefficient between 0 and –1 and is significant at the 1% level.

Analysing the short-term FE-DK and the international departures, the GDPpc and exchange rate coefficients are positive and statistically significant, that is, they impact the number of international pilgrims at the Shrine of Fátima. The long-term impacts were calculated using the ratio between the variable's coefficient and the LPIL coefficient, both lagged once, and the ratio was multiplied by '–1'. The coefficients on international departures and GDPpc are positive. Unemployment has a negative effect on the number of international pilgrims to the Shrine of Fátima. All are statistically significant at the usual
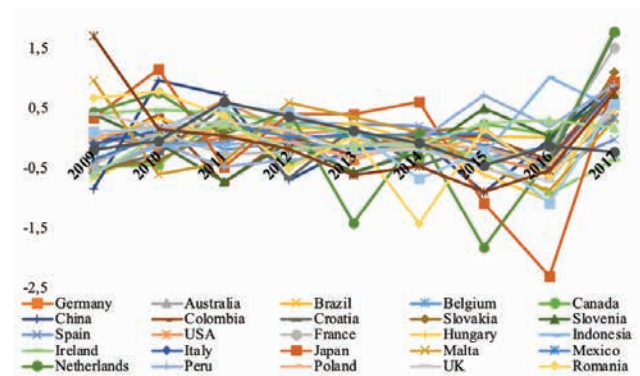

Figure 3: Residues of estimation
Source: Authors' elaboration

Table 7: Estimation results (corrected shocks)

Dependent Variable: DLPIL	Coefficients	FE	Coefficients	FE-DK
Constant	−41.51392	***	−41.51392	***
jap2016	−2.82544	***	−2.82544	***
ndl2017	2.047733	***	2.047733	***
Dldepa	2.35E-08		2.35E-08	**
Dlgdppc	2.760323	**	2.760323	**
Dexc	0.013365	*	0.013365	*
lpil(-1) (ECM)	−0.9630423	***	−0.9630423	***
Diagnostic statistics				
N	261		261	
R^2	0.5233		0.5233	
F stat	F(9, 223) = 27.21		F(9, 8) = 4874.67	
Prob	***		***	

Notes: ***, **, * denote statistical significance at 1%, 5% or 10% levels, respectively; the Driscoll & Kraay (1998) standard errors were used to estimate the models.

Table 8: Impacts and speed of adjustment

Dependent Variable: DLPIL	Coefficients	FE	Coefficients	FE-DK
Short-term impacts				
Dldepa	2.35E-08		2.35E-08	**
Dlgdppc	2.760323	**	2.760323	**
Dexc	0.013365	*	0.013365	*
Long-term impacts				
ldepa(-1)	1.133986	***	1.133986	***
lgdppc(-1)	2.812038	***	2.812038	***
une(-1)	−0.0381511		−0.0381511	***
Speed of adjustment				
ECM	−0.9630423	***	−0.9630423	***

Notes: ***, **, and * denote statistical significance at 1%, 5% and 10% levels, respectively; the ECM denotes the coefficient of the variable LPIL lagged once.

significance levels. The UNE (in the short-term) does not show a significant statistic. Figure 4 graphically summarises the results based on FE-DK analysis.

5 Discussion

Supported by the above results, the relationship between economic determinants and the phenomenon of international pilgrimage to the Shrine of Fátima is confirmed. Furthermore, these results partly corroborate the theory of consumption applied to religion (e.g., Oliveira et al., 2011) since the pilgrimage is seen as a tourism service and the contemporaneous research adopts the approach of 'religion as a product' (Collins-Kreiner, 2020). Thus, verifying the relationship between economic determinants and pilgrimages in other shrines contributes to a better understanding of how the economy can influence the analysed phenomenon through time series, cross-sectional or longitudinal data models. This last type of study, a blend of the other two, is now beginning to appear in this research area (e.g., Belucio & Fuinhas, 2019; Belucio et al., 2021).

The negative impact of unemployment on international pilgrimages was, in a way, expected, as the results of Mourao (2012) already suggested that unemployment was related to religious phenomena. Nevertheless, this result is helpful since it informs financial and human
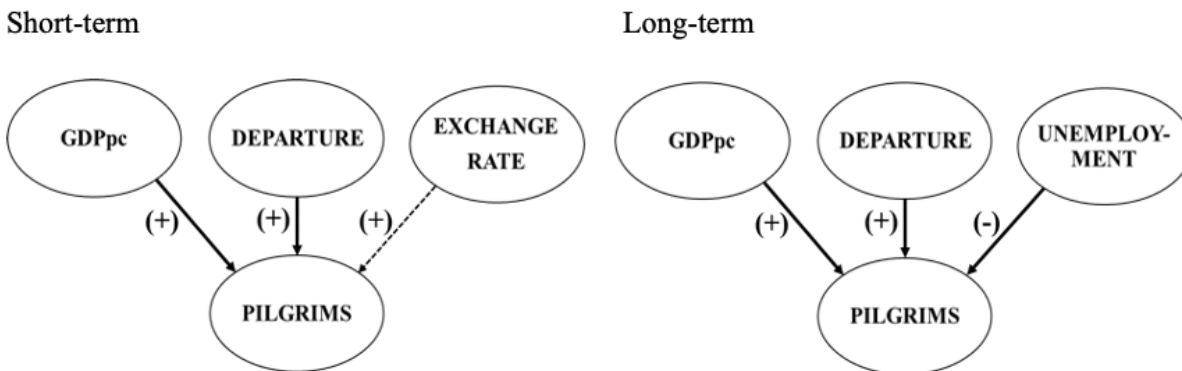
Figure 4: Resume of results
Source: Authors' elaboration

resources investment to promote the Shrine of Fátima as an international destination. Therefore, decision-makers in Portugal, the city of Fátima, and the Shrine of Fátima can better manage their actions based on this variable, opting to reduce investments in publicity and advertising in countries with an increase in the UNE.

International departures show a positive impact (in the short- and the long-term) on international pilgrimages. So, government measures that collaborate to attract international tourists from these countries will help attract a few to visit and spend some time in Fátima. The shrine, the private sector and the local public sector aim to reinforce the country's image as an international destination and welcome visitors. The literature supports the tourism-led growth hypothesis in Portugal (e.g., Bento, 2016; Proença & Soukiazis, 2008). Increasing international arrivals attracted by religious phenomena benefit the shrine, the cities' local economy and national economic indicators.

The real effective exchange rate positively impacted the number of international pilgrims to the Shrine of Fátima. An appreciation in the exchange rate indicates a decrease in the price competitiveness of the international pilgrims' local economy. This variable is fundamental in transactions between the residents and non-residents. Many European international pilgrims bring euros from their countries and do not need currency exchange. Portugal is a member of the European Union and joined the single currency (euro). Therefore, if the euro appreciates against other currencies, the Europeans will be in a better economic situation to travel outside the euro area, even though Portugal is one of the most attractive destinations in Europe for travellers. For that reason, the country can lose tourists from the euro area and developing countries, such as Latin Americans and Africans. Therefore, developing partnerships that encourage religious visits and minimise the effects of exchange rate movements is essential.

Domestic average income levels, measured here through GDPpc, positively impact international pilgrimages (in the short- and long-term). This result reinforces that wealth variation tends to originate from more international pilgrims. That is why the Catholic Church can develop measures to encourage and support international pilgrimages from the poorest countries, for example, allocating part of museum ticket sales, candle sales and other items for this purpose. Something similar occurs in the WYD applications, the pilgrimage of the Catholic Church with a focus on the young, where pilgrims from developed countries pay a higher application fee than pilgrims from poor or developing countries.

These results and inferences were previously found in Belucio et al. (2019). As far as we know, this study was one of the first to suggest that events (such as WYD confirmed for Lisbon 2023, after candidature in 2018/2019), and spiritual retreats can help the local economy of the sanctuary city directly or indirectly. For example, the WYD pilgrimage usually boosts the economy by attracting millions of participants (which was confirmed in the last editions of the event in Rio 2013, Krakow 2016 and Panama 2019). That is why Fátima and Portugal can be positively impacted. However, the State and the Church must take some precautions, as the State is a laic entity, and the event (WYD) is religious. In this sense, the local and national population must be shown the benefits of hosting this pilgrimage, the estimated cost, and the return. In addition, it ensures the optimisation of resources and strengthens mechanisms to combat corruption.

Pilgrimage tourism cannot escape the shock caused by the COVID-19 pandemic that impacted everyone and most economic sectors. However, encouraging pilgrimages and inviting pilgrims worldwide will benefit the shrine and the Portuguese economy, which should see pilgrimage tourism revenues as an essential part of its portfolio.

Like all methods, this model also has limitations. For example, the only way to analyse the impact of variables in pairs would be to develop a new study to capture these relationships. Furthermore, it is difficult to fulfil the statistical requirements for implementing this model in religious tourism, which may imply low replication due to Catholic shrines' lack of statistical data, but an opportunity for other religions that have data on pilgrimage to their shrines and temples.

6 Conclusions

This study verified the impact of economic determinants on international pilgrimages to the Shrine of Fátima. An ARDL panel was employed, to account for different variables' integration orders. The panel data set comprises 29 countries with a time horizon from 2008 to 2017 (annual data). This methodology allowed the general objective of this study to be accomplished, with several statistically significant relationships between the countries' economic performance and the religious phenomenon being identified.

The econometric model made it possible to discriminate between short- and long-term impacts. International departures, GDPpc, and the exchange rate statistically significantly impact the number of international pilgrims to

the Shrine of Fátima (in the short term). In the long term, GDPpc and international departures positively impact the number of international pilgrims, while the UNE reveals a negative and statistically significant coefficient.

The Shrine of Fátima welcomes pilgrims and national and international visitors. The city of Fátima is heavily dependent on religious tourism. So, decision-makers (public and private) and the shrine management must be aware of all the variables that may deter the influx of pilgrims and tourists. Understanding more about the economic situation of the different countries of origin of the pilgrims is essential to the growth of Fátima as a place of international pilgrimage. That works directly to benefit Portugal's tourism sector and economic growth strategy, which must be reinvented after the COVID-19 pandemic. Fuinhas et al. (2017a) propose for Portuguese religious tourism to grow without harming the image of locals.

The data contemplates a short time horizon. Thus, the reapproach of the theme can be carried out by covering a more significant number of years and countries. Furthermore, the 'number of international pilgrims by country' variable considers only those previously registered as pilgrims. Foreign tourists who include a religious tour at the last minute in their plans but effectively comply with pilgrim precepts are not counted in the pilgrim statistics. Therefore, they are included only in the number of visitors, thus generating a gap for future studies addressing the economic determinants of pilgrims and international visitors. Another critical issue to be developed is the environmental impact of pilgrimages to Catholic shrines.

Future approaches can be made using the same panel data structure. For example, the use of panel vector autoregressive and Granger causality tests could reveal whether the feedback effect between the variables exists, that is, it could be verified how the variables are related when being analysed in pairs. The debate on the economic determinants of pilgrimage can benefit from discussing the physical distance (or the costs of distance) between the international origin of the pilgrims and the shrine.

Other exchange rates may be used in this type of study, for example, a bilateral measure between the countries of origin and the Portuguese currency (or that of the country of religious tourism). A variable with this characteristic could capture the cost for international tourists. Furthermore, the real effective exchange rate also provides relevant information, as it is a good indicator of economic stress of the country of origin.

Finally, as our study considers only the macroeconomic determinants for the phenomenon, we suggest using micro indicators such as the percentage of Catholics (or the absolute number of Catholics) in each country in

a time-series approach. Adding distance and transport costs for a microeconomic approach would be feasible and entirely reasonable.

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Bionotes

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