6 The Importance of ICT for Tourism Demand: A Dynamic Panel Data Analysis

Célia M.Q. Ramos and Paulo M.M. Rodrigues

6.1 Introduction

The union between ICT (Information and Communication Technology) and tourism, designated as electronic tourism or etourism, has enabled the strategic management of companies linked to the tourism sector, and has also revolutionized operations within the tourism distribution channel, forcing the re-evaluation of actions and positioning by stakeholders.

According to Buhalis (2003), ICT enable tourism industry to become more flexible by allowing for faster and more efficient responses to requests from customers, while reducing operating costs and enabling more competitive prices. Associated with the development of ICT, the Internet has emerged as an excellent platform for communication and sharing information facilitating instant access and distribution of tourist information, allows for the booking of tourism products, and permits tourism organizations to reposition themselves in the value chain and to reach more tourists than through traditional channels because of the interactive environment in which customers may create their travel according to their wishes and needs (see Buhalis and O'Connor 2005; Garbin Praničević 2006; Pease et al. 2005; WTO 2001).

Electronic distribution in tourism has grown markedly over the last two decades. The potential of technology associated with this activity has been recognized by tourists, intermediaries and producers; and resulted in its adoption by organizations,

C.M.Q. Ramos (✉)
ESGHT – Universidade do Algarve, Campus da Penha, Faro 8005-139, Portugal
e-mail: cmramos@ualg.pt

P.M.M. Rodrigues
Banco de Portugal, Av. Almirante Reis, 71-6th floor, Lisbon 1150-012, Portugal

Colégio de Campolide, Universidade Nova de Lisboa, Campus de Campolide, Lisboa 1099-032, Portugal
e-mail: pmrodrigues@bportugal.pt

Á. Matias et al. (eds.), *Quantitative Methods in Tourism Economics*,
DOI 10.1007/978-3-7908-2879-5_6, © Springer-Verlag Berlin Heidelberg 2013

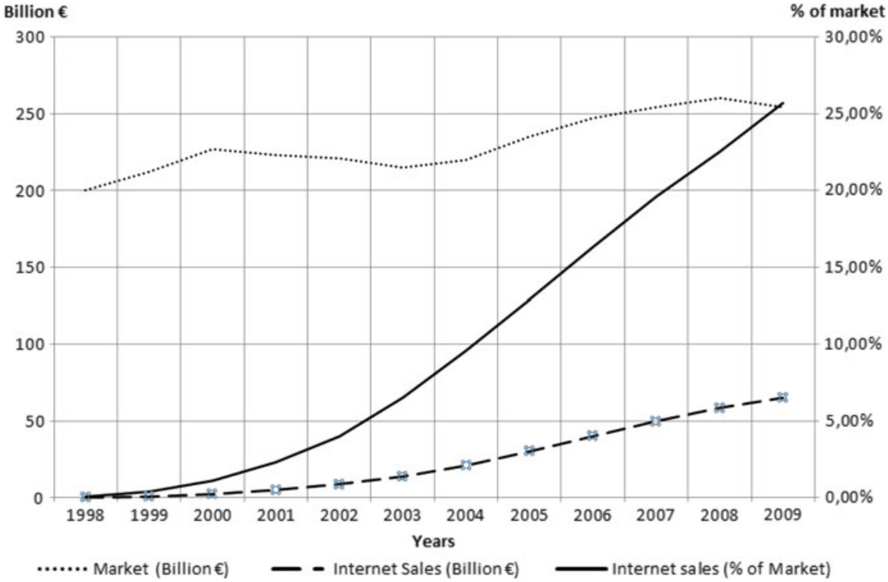

Fig. 6.1 Trends in overall online travel market size in Europe (Source: Marcussen 2009)

professionals and travellers. This is noted by the growing number of online sales (see Marcussen 2009), as presented in Fig. 6.1.

The technology that surrounds tourism activity cannot be ignored in terms of demand, since in addition to information sharing, communication, booking and purchasing of travel products, it also provides a decision support environment that tourists can access prior to or during their trip.

In this sense, the role of technology and its developments in tourism and in society cannot be neglected in the analysis and modelling of tourism demand. In this regard, dynamic panel data models are suitable to model economic relations, such as, e.g. habit persistence and training, that exist within the tourism activity and which are not adequately captured by other models (Verbeek 2004). Panel data models consider variables observed over time and across different units, and can identify and measure effects that simply are not detected through the purely sectional or temporal analysis of data.

This paper is structured as follows. Section 6.2 presents an overview of the potential of tourism distribution through the Internet; Sect. 6.3 provides a characterization of tourism demand as well as the tools needed to set up the panel data model; Sect. 6.4 introduces the dynamic panel data model and discusses inference and estimation associated to this model; Sect. 6.5 presents the results obtained from the dynamic panel data model and finally, Sect. 6.6 presents the main conclusions.

6.2 Tourism Distribution and ICT

Information is vital for tourists since decisions have to be made when purchasing a trip (Xiang and Fesenmaier 2006). In particular, a tourist has to decide, e.g. what destination to choose, at what time of the year to travel, what is the best means of transportation, and what is the best accommodation. According to Sheldon (1989: 589), "Information is the lifeblood of the tourism industry", travellers, travel agents, suppliers and all stakeholders in the tourism distribution chain need information. The use of ICT in tourism, has allowed organizations to improve the flow of information, has facilitated the exchange of information between actors; has improved response times to external requests, a faster and efficient form to answer inquiries from tourists; has increased tourism development in a society increasingly competitive, and introduce more competitive prices (Buhalis and Law 2008).

At the conceptual level, the relationship between ICT and the tourism sector has been under analysis since the early 1990s; see, *inter alia*, Buhalis (2003), Xiang and Fesenmaier (2006), Garbin Praničević (2006), Gretzel et al. (2004), Pease et al. (2005), Poon (1993), O'Connor (1999), Werthner and Klein (1999), and Sheldon (1997). Given that tourism is highly dependent on information, these authors consider that the development of ICT has been the main driver of changes in the development of tourism and related organizations (Ramos et al. 2009).

Organizations can use ICT strategically to increase the differentiation of their products and add value to existing offers (Bazini and Elmazi 2009; Garbin Praničević 2006; Paskaleva 2010). ICT applied to tourism activities has gradually involved the reengineering of the entire range of processes associated with the distribution channels and all players have to re-evaluate their position and core competencies (Buhalis and O'Connor 2005). The role of each player in the distribution channel, within the operational management of tourism, will be critical to appreciate the range and nature of the new emerging technologies. Distribution becomes one of the most critical factors for the competitiveness of destinations and tourism businesses (Buhalis 2003).

Tourism distribution can be defined as the process consisting of all steps through which a consumer good passes, from the moment that it is produced until it becomes available to the consumer (Cunha 2003), creating a tourism distribution channel, i.e. an operational structure (a system of relations or various combinations of organizations), through which a producer sells goods and services or confirms the trip to be purchased.

The main functions of tourism distribution are to provide information, and to combine and organize trips (Buhalis 2003). The development of ICT allowed for the creation of technological platforms which allowed for the establishment of a wide network of information between stakeholders (Pease et al. 2005) and, which today, has become fundamental to the tourism industry and a critical factor of the success of tourism distribution. Tourism distribution implemented through distribution systems over the Internet, or through electronic means, is referred to as Electronic Distribution (Ramos et al. 2009). From Fig. 6.2 it can be observed that Electronic Distribution has profound implications on the satisfaction of tourism

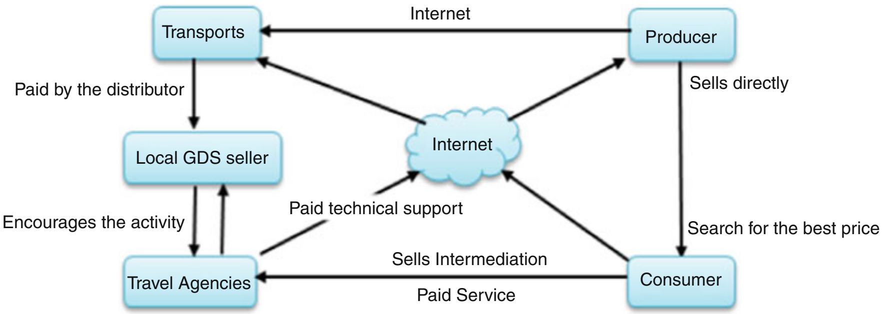

Fig. 6.2 Tourism distribution (Source: Adapted from Cunha 2003: 321)

demand, since it enables the interconnection between consumers, producers and intermediaries, while at the same time providing tools for developing marketing strategies (Buhalis 2003).

According to the World Tourism Organization (WTO 2001) the partnership between the Internet and tourism is ideal, because it allows for instant and intuitive interconnections between the agents involved in tourism distribution. For tourists, it provides access to relevant information on destinations, and allows for a quick and easy reservation process. For tourism businesses and destinations, it enables the development of a reservation system for a wider number of customers at a lower cost, and provides a tool for communication and development of relationships between trading partners, suppliers and intermediaries. These characteristics are of great importance due to the fact that tourism products are complementary in nature, implying the need of being easily and instantly accessible from several points around the globe, and naturally, also require a constant, effective and efficient updating of information by current tourism information systems (TIS).

6.3 Tourism Demand Analysis and Modelling

The analysis of tourism demand and the factors that may affect it has generated great interest among researchers worldwide, see for instance, Brida and Risso (2009), Crouch (1994), Daniel and Rodrigues (2005), Uysal (1998), and Witt and Witt (1995). In tourism demand analysis it is necessary to determine how to measure demand and the factors or determinants that explain it. The list of determinants and variables used in several studies is extensive but because of the difficulty experienced in the relationship between all variables (Uysal 1998) and data limitations (Song and Witt 2000), only a limited set is typically used. In particular, the variables generally considered in the literature are population, income, prices (cost of travel to a destination and cost of living in a destination), substitute prices, exchange rates, and marketing variables; see, for instance, Crouch (1994), Daniel and Rodrigues (2005), Song et al. (2009), Uysal (1998) and Witt and Witt (1995). However, to the best of our knowledge, with the exception to the work by Fleischer and Felsenstein (2004) and Mavri and Angelis (2009), variables that characterize the technological environment have, so far, not been considered in tourism demand modelling and forecasting.

Based on the discussion of the previous section, analysing tourism demand without regards to the technological environment seems reductive. Hence, it is relevant to identify variables that may be used to help better understand tourism demand in a predominantly technological environment. Variables, such as, for example, the year in which a promotional site of a particular destination appeared, the number of overnight stays booked online, or the year from which on it was possible to make online reservations for a given destination, are potential proxies that may be used.

Estimating future expected tourism demand is critical to the planning of related activities, such as, for example, for investment decisions in infrastructures at the destination (airports, motorways, railways, accommodations, health centres and other support services, etc.), which require planning and long-term investment.

Predictions are of great importance, since the resulting projections may be incorporated into the decision-making process. This importance becomes even more evident if we consider that economic conditions change over time, and that decision-makers must find ways to detect and prevent the impacts of these changes on their business and on the economy.

Panel data models are an ideal tool to analyse tourism demand in this context, since these models allow us to simultaneously consider temporal and sectional characteristics of the data, and to control the individual heterogeneity of each section, present more information, more variability, permit to study the dynamic adjustment arising unexpectedly, and to identify and measure effects that simply are not detected in the data that are purely temporal or sectional. Furthermore, with these models it is possible to produce forecasts which are important for the decision making process and to professionals related to tourism, as a way to prevent from unexpected changes that may occur in the environment that surrounds tourism activity.

6.4 Dynamic Panel Data Models

A simple dynamic panel data model is,

$$Y_{it} = \delta Y_{it-1} + \beta X_{it}{}' + \varepsilon_{it} \tag{6.1}$$

with $i = 1,\ldots, N$, $t = 1,\ldots,T$; and ε_i is iid$(0,\ \sigma_\varepsilon^2)$.

Panel data with a temporal dimension, T, and a crossectional dimension, N, which are moderate to large, are designated as “Data Field” (Quah 1994), “Panel Time Series” (Smith and Fuertes 2010), or “Macro Panel Data” (Baltagi and Kao 2000; Matyas and Sevestre 2008). In these panels the time series properties, such as nonstationarity, spurious regressions and cointegration need to be taken into consideration (see Verbeek 2004).

6.4.1 Panel Data Unit Root Tests

In macro panel data it is important to test whether the panel is nonstationary, through unit root tests which are based on the following test regression,

$$Y_{it} = \alpha_i + \gamma_i y_{i,t-1} + \varepsilon_{it} \tag{6.2}$$

or alternatively as,

$$\Delta \mathrm{y}_{\mathrm{it}} = \propto_{\mathrm{i}} + \ \pi_{\mathrm{i}} \mathrm{y}_{\mathrm{i,t-1}} + \ \varepsilon_{\mathrm{it}} \ \text{ where } \ \pi_{\mathrm{i}} = \ \gamma_{\mathrm{i}} - 1 \tag{6.3}$$

The null hypothesis (H_0) is that all series have a unit root, i.e. $H_0 : \pi_i = 0$ for each country i. The immediate first choice for the alternative hypothesis is that all series are stationary with the same mean reversion parameter, i.e. $H_1 : \pi_i = \pi < 0$ for each country i, as used by Levin and Lin (1992). However, a more general alternative hypothesis which allows for the mean reversion parameter to be different across countries, i.e., $H_1 : \pi_i < 0$ for at least country i, can also be considered, following the procedures by Maddala and Wu (1999), Choi (2001) and Im et al. (2003). Furthermore, additional to the unit root tests already mentioned, the tests by Levin et al. (2002), the ADF (Augmented Dickey-Fuller) test, and the tests by Breitung and Meyer (1994), Harris and Tzavalis (1999) and Holtz-Eakin et al. (1988), can also be considered.

Essentially, panel unit root tests are classified into first and second generation tests (Matyas and Sevestre 2008), where the difference lies in the fact that first generation tests consider that the sections are independent whereas second generation tests allow for dependence between sections (see Hurlin and Mignon 2004, for an overview).

6.4.2 Panel Data Cointegration Tests

According to, *inter alia*, Engle and Granger (1987) and Smith and Fuertes (2010) if there is a linear combination of I(1) variables, which is I(0), then the I(1) variables establish a cointegrating (long-run) relationship. Several procedures have been proposed to test for cointegration in panel data; see, for instance, the Dickey-Fuller (1979) type test applied to residuals proposed by Kao (1999) (also known as Kao test), the LM (Lagrange multiplier) test proposed by McCoskey and Kao (1998), and the tests proposed by Pedroni (2004).

The Kao (1999) test is applied to the residuals of a fixed effects model, to test for the null hypothesis of no cointegration between non-stationary variables (in line with the work of Engle and Granger 1987); the McCoskey and Kao's (1998) test procedure is based on an LM test applied to the residuals of the long-run regression to test for the null hypothesis of cointegration; and finally, the tests proposed by Pedroni (2004) are used to test the null hypothesis of cointegration in heterogeneous panels.

The existence of cointegration among nonstationary variables ensures the existence of a long-run equilibrium between them, which is defined by a cointegrating vector, that can be estimated by a panel ARDL model as will be discussed next.

6.4.3 The ARDL Model

According to Smith and Fuertes (2010: 27), a widely used time-series model to examine the relationship between economic variables is the Dynamic Linear Regression Model or the ARDL (AutoRegressive Distributed Lag) model.

In the case of a model with two exogenous variables $(\mathrm{x_t}, \mathrm{z_t})$ an ARDL(p, q, r) takes the form,

$$y_{it} = \alpha_0 + \sum_{j=1}^{p} \alpha_j y_{it-j} + \sum_{j=0}^{q} \beta_j x_{it-j} + \sum_{j=0}^{r} \gamma_j z_{it-j} + u_{it}. \tag{6.4}$$

The estimation of an ARDL model by OLS is asymptotically biased unless the explanatory variables $(x_{it}, i = 1, \ldots, N)$ are exogenous and the dynamics is homogeneous for all i sections of the panel (Scarpelli 2010). Alternatively, Fully Modified OLS (FMOLS) and Dynamic OLS (DOLS) may present better performance than OLS by correcting for endogeneity and correlation of the regressors.

6.5 Dynamic Modelling of Tourism Demand with Macro Panel Data

Tourism demand analysis is a complex process because the tourism sector encompasses information from different sectors which are complementary to each another. Furthermore, investigating the phenomenon of tourism without considering the technological environment that supports it represents an important constraint.

Currently, the technological environment that surrounds the tourism activity allows travelers to select, book and purchase tourism products through the Internet through Tourism Information Systems based on the Web as, for example, the Amadeus Global Distribution System (www.amadeus.com), Computer Reservations Systems, Expedia (www.expedia.com) and Travelocity Internet Distribution Systems (www.Travelocity.com), among others. In addition to existing ICT this environment also allows for an efficient electronic distribution of tourism products, allows for the reduction of barriers to small but creative enterprises, since it allows for direct sales to customers (Bazini and Elmazi 2009; Bloch and Segev 1997; Buhalis and

O'Connor 2005; Garbin Praničević 2006; Paskaleva 2010; WTO 2001). The aim of this study is to empirically analyse whether ICT has contributed to tourism demand growth in a particular country.

6.5.1 Model Specification

Analysing tourism demand for a particular country means that it is relevant to know what determines the choice for that country. In this sense, it is necessary to identify the determinants of tourism demand, as well as the most appropriate measure of demand, and define the relationship between variables by specifying a demand function.

To identify the determinants that explain tourism demand as well as the variable that enables its measure, it is necessary to identify the places chosen as destinations, the number of temporal periods considered in the sample and other relevant characteristics important to this investigation.

Countries: In 2007, according to Euromonitor International data (World Economic Factbook), the number of international overnight stays was 2.158.743.800, with 43.38 % corresponding to Western Europe, i.e. the region that has captivated more tourism in the world. For the present study 18 Western European countries were considered, namely: Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Holland, Ireland, Italy, Norway, Portugal, Spain, Sweden, Switzerland, Turkey and United Kingdom.

Temporal Sample: The sample considered in this study covers the period from 1993 to 2007.

Dependent variable: The dependent variable used was the number of international overnight stays in a particular country.

Determinants: Following the earlier discussion on the determinants of tourism demand, we consider as possible explanatory variables productivity as representative of population (P); GDP (Y), as representative of income; Consumer price index (C), as representative of the price component of cost of living at a destination; Passengers transported (V), as representative of transportation price – component of cost of travel to the destination; Purchasing power parity (E), as representative of exchange rates; Total spending on advertising (A), as representative of marketing; and a dummy variable (M) which considers the beginning of the electronic commerce in 2002.

In order to also assess the influence of technology on tourism demand, and taking into account the difficulty felt at the national and international level to obtain data that represent the technological environment that surrounds this activity, the number of Internet users (I) was chosen to characterize the available technologies in a particular country that support the tourist activity. This variable is considered as an attempt to represent all tourism entities and professionals whose work is the electronic dialog with the tourist or the management of online tourism, such as in the sale of products or the reply to tourist inquiries. The Internet represents an excellent technological platform that supports tourism, since it enables the sharing, distribution, communication, booking and sale of tourism products.

6.5.2 The Tourism Demand Function

The tourism demand function considered is,

$$D_{it} = \alpha_i P_{it}^{\beta_1} Y_{it}^{\beta_2} C_{it}^{\beta_3} V_{it}^{\beta_4} E_{it}^{\beta_5} A_{it}^{\beta_6} I_{it}^{\beta_7} M_{it}^{\beta_8} \mu_{it} \tag{6.5}$$

where

Di is the number of nights international tourists spent in country *i*;

P_i is the productivity in country *i*;

Y_i is the level of income in country *i*;

$C_i$is the cost of living in destination *i*;

$V_i$is the cost of travel to destination *i*;

E_i is the exchange rate in country *i*;

A_i is the total spend in advertising by country *i*;

I_i is the number of the Internet users in country *i*;

M_i is a dummy that considers that the beginning of electronic commerce occurred in 2002.

μ_i is a disturbance term.

In addition, to allow for direct comparison with other studies in tourism, the functional form in (6.5) allows for the identification of the elasticity associated with a particular variable and the consequent impact that this variable has on tourism demand.

6.5.3 Data Collection and Variable Construction

The panel data structure has the configuration of a table, consisting of a number of columns equal to the number of variables to be included in the model and the number of rows equal the number of sections (countries) multiplied by the number of time units (years).

Table 6.1 Characterization of the explanatory variables in tourism demand

Variable	Units	Source
P	People per Km^2	*Trade sources, National statistics*
Y	€ mn (thousands of Euro)	*International Monetary Fund (IMF), International Financial Statistics*
C	€ mn (thousands of Euro)	*Trade sources, National statistics*
V	Thousands of people	*International Civil Aviation Authority, National Statistics*
E	Dollars	*National Statistics*
A	€ mn (thousands of Euro)	*World Association of Newspapers*
I	Thousands of people	*International Telecommunications Union, World Bank, Trade Sources, Euromonitor International*
M	Takes the value 1 if the year >= 2002	Eurostat
	And takes the value of 0 if the year < 2002	

The variable considered to measure tourism demand was the number of overnight stays by international tourists (*D*). This variable is expressed in thousands of people and its source was the WTO (World Trade Organization).

The independent variables used to help explain tourism demand for a particular country are as described previously (see Table 6.1 for a summary). The variable *M*, which represents a dummy variable, will analyse the effect of the e-commerce on tourism demand. Due to gaps and omissions of data, we considered that the e-commerce emerged around 2002. Thus, the dummy variable *M* will be zero for years before 2002 and one from 2002 onwards. This assumption is made for all countries considered.

6.5.4 Dynamic Modelling and Estimation with Macro Panel Data

The potential of analysis of panel data models have been increasingly evident, due to the characteristics previously mentioned, and together with the technological developments have provided the possibility to collect, store and process data, and to perform complex calculations, leading to the development of panels with a large time dimension, *T*, and a large number of cross-section units, *N*.

However, with the increase of the temporal dimension of the panels, concepts relating to time series in panel data where integrated in the modelling exercise in order to investigate the properties of the economic variables. This allows, for instance, to investigate the effects caused by the application of a given policy to a particular sector.

The panel ARDL model considered to characterise tourism demand is,

$$\begin{aligned} lnD_{it} = \alpha_i &+ \beta_{1i} lnD_{t-1} + \beta_{2i} lnP_{t-1} + \beta_{3i} lnY_{t-1} + \beta_{4i} lnC_{t-1} \\ &+ \beta_{5i} lnV_t + \beta_{6i} lnE_t + \beta_{7i} lnA_{t-1} + \beta_{8i} lnI_t + \beta_{9i} M_{it} + u_{it} \end{aligned} \tag{6.6}$$

where $i = 1,2,\ldots, N$ countries and $t = 1, 2, \ldots, T$ time periods.

Table 6.2 Unit root tests results

Tests	Levin, Lin e Chu (LLC)	Im, Pesaran e Shin (IPS)	ADF – Fisher	PP – Fisher	Results: (5 % level of significance)
Null H.: variable	H0: assume a common unit root	H0: assume an individual unit root	H0: assume an individual unit root	H0: assume an individual unit root	H0: the series are not stationary
LnD	−3.17025 (0.0007)	**−2.8240 (0.3888)**	**27.3220 (0.5008)**	79.5889 (0.0000)	H0 accepted by the IPS and ADF tests
					Non stationary
LnP	**2.57855 (0.9950)**		**3.51894 (1.0000)**	**1.89614 (1.0000)**	H0 accepted by all the tests
					Non stationary
LnY	**−0.98888 (0.1615)**	**3.35766 (0.9996)**	**15.1079 (0.9773)**	44.1825 (0.0267)	H0 accepted by LLC, IPS and ADF tests
					Non stationary
LnC	**−0.51405 (0.3036)**		**4.48419 (0.9999)**	41.2267 (0.0035)	H0 accepted by LLC and ADF tests
					Non stationary
LnV	−3.95280 (0.0000)	**0.92241 (0.8218)**	**26.1731 (0.5635)**	47.6740 (0.0116)	H0 accepted by IPS and ADF tests
					Non stationary
LnE	−3.57054 (0.0051)		**16.4733 (0.5596)**	**14.5615 (0.6918)**	H0 accepted by ADF and PP tests
					Non stationary
LnA	−3.04023 (0.0012)	**0.45219 (0.6744)**	**21.8950 (0.7861)**	**27.3474 (0.4994)**	H0 accepted by IPS, ADF and PP tests
LnI	−11.1568 (0.0000)	−6.63803 (0.0000)	96.1714 (0.0000)	210.991 (0.0000)	H0 rejected by all the test
					Stationary

In a panel with a high time dimension, *T*, one concern must be the potential existence of unit roots i.e., whether the panel is stationary or not (Verbeek 2004).

6.5.5 Unit Root Test Results

The stationarity of the series used in this study can be determined from Table 6.2, which presents the results obtained for various panel unit roots test.

Taking into account the results of the tests presented in Table 6.2, it was concluded that all series, with the exception of the number of Internet users (*I*), are non-stationary. However, using Granger Causality tests where the null hypothesis is that a variable does not cause the other, we obtained a *p-value* of 0.0099. Thus, we observe that the null hypothesis was rejected at a 5 % significance level,

Table 6.3 Estimation results of the ARDL macro panel data model

	First estimation		Final model	
	$R^2 = 0.9972$		$R^2 = 0.9972$	
	R^2 adjusted = 0.9969		R^2 adjusted = 0.9969	
	Coefficient	Probability	Coefficient	Probability
c	5.3290	0.0000	5.3189	0.0000
LnD_{it-1}	0.6801	0.0000	0.6887	0.0000
LnP_{it-1}	0.0033	0.9025		
LnY_{it-1}	−0.0578	0.0000	−0.0676	0.0000
LnC_{it-1}	0.0851	0.0000	0.0802	0.0000
LnV_{it}	0.0461	0.0390	0.0399	0.0321
LnE_{it}	−0.0364	0.0000	−0.0384	0.0000
LnA_{it-1}	−0.0187	0.3032		
LnI_{it}	0.0134	0.0297	0.0077	0.0359
M_{it}	−0.0173	0.1510		

which implies that the variable *LnI* will continue to be included in the model. Given the nonstationarity of several variables it is also important to know whether there is cointegration.

6.5.6 Cointegration Tests

From the application of panel cointegration tests to the variables used in this study we obtained a test result of 5.7210 for the Kao test (*p-value* of 0.00). Thus, the null hypothesis was rejected at all usual significant levels, i.e., 10 %, 5 % and 1 %, and it can therefore be concluded that there is evidence of cointegration between the variables of the model, i.e., although the variables are non-stationary, they establish a stationary long-run equilibrium relationship.

The existence of cointegration among the nonstationary variables ensures the existence of a long-run equilibrium between them, which is defined by a cointegrating vector. The estimation of this vector can be done using the panel ARDL model in (6.6). The estimation results are presented in Table 6.3. In the first estimation, the quality of adjustment was 99.72 %, however, it showed non-significant variables (at a 5 % significance level) which were excluded from the model.

In the final model we removed the variables whose *p-value* exceeded 0.05, i.e., the variables related to population, marketing and electronic commerce. In this model, the determinants which affect tourism demand in the countries under analysis are: the lag of overnight stays, the lag of income, the lag of the cost of living at the destination, the current cost of travel to the destination, the current purchasing power and the environment provided by ICT.

Furthermore, according to the results of Table 6.3 it can be concluded that the number of Internet users positively affects tourism demand with an elasticity of 0.0077.

6.6 Conclusion

Panel data models are suitable for dynamic modelling of economic relations. In the present study based on the modelling and estimation of the cointegration vector it was concluded that it is important to include the variables that define the current tourism behaviour. In addition, estimates show a good specification and allow us to conclude for the existence of a long-term relationship between variables.

We also conclude that the number of Internet users, as representative of the technological environment provided by current and emerging technologies, contributes to an increase of tourism demand for a given country.

The panel ARDL model presented in this study deserves further analysis as it is the basis for the development of other models, such as, for example, panel error correction models which allow for the short and long-run dynamics between variables to be explicitly considered.

In future work we will investigate tourism demand in a group of homogeneous countries, or the countries will be grouped in groups of homogeneous nature. Furthermore, it will be interesting to look at other variables that may represent the environment provided by ICT in tourism demand, such as: "the number of tourist organizations with sites in the Internet" or "the number of overnights stays that was reserved online".

Acknowledgements The authors thank Peter Nijkamp and two anonymous referees for valuable comments and suggestions.

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