Tourism Management Perspectives 38 (2021) 100808

Contents lists available at ScienceDirect

Tourism Management Perspectives

journal homepage: www.elsevier.com/locate/tmp

Estimating cruise passenger's expenditure: A censored system approach

J.F. Baños, B. Tovar *

Oviedo Efficiency Group, Department of Economics, University of Oviedo, Avenida del Cristo s/n 33071, Spain

ARTICLE INFO

Keywords:
Cruise passenger expenditure during stopovers
Economic impacts onshore
Canary Islands
Multivariate tobit system
Drivers of expenditure by category

ABSTRACT

Cruise ship passenger spending patterns are analyzed for the archipelago of the Canary Islands, as such patterns represent a key element in the evaluation of the economic impact of cruise ships on residents and local stakeholders. Over six cruise seasons, data regarding cruise passenger expenditures were collected via survey responses at each stopover. Since the five categories of expenditure analyzed are censored and possibly correlated, we have estimated a multivariate tobit system. This approach offers more efficient estimates of the determinants of cruise passengers' onshore spending, which can be useful in designing economic policies. Our results show that gender, age and socioeconomic status affect cruise passenger spending patterns significantly and, more importantly, in different ways depending on the expenditure category. Therefore, it seems that more personalized marketing strategies (i.e., gender/age/nationality-oriented) classified by expenditure category should be more efficient and, therefore, implemented to achieve greater local economic impact.

1. Introduction

During the last two decades, with the only exception of the COVID-19 pandemic, the cruise ship business has recorded a steady rate of growth. Although this is a resilient industry that was able to successfully overcome previous crises, it is, within the tourism sector, one of the most adversely affected by the pandemic (Sharma & Nicolau, 2020). After the voluntary suspension of cruise operations worldwide in mid-March 2020, the industry timidly resumed the activity in some destinations in Europe, Asia and the South Pacific in July 2020, by the implementation of enhanced health measures and new security protocols.

Following the 2020 industry trends recently published by CLIA, it seems that there is a place for hope and optimism in relation with the 2021 (CLIA, 2021). Moreover, the COVID-19 crisis has shown that in the post-pandemic era not only guest and crew safety is key to the cruise restart, but also the protection and management of cruise destinations. The COVID-19 crisis has made the cruise industry aware that the sector and destinations should work together ensuring that sustainability remains on the agenda, and especially helping to generate a positive global (economic) impact on the destination.

As an industry, cruises accrue benefits at their destinations in terms of investment, employment, tax, economies of scale, positive externalities and overall economic growth (Dwyer & Forsyth, 1998). Namely, the economic benefits generated by cruise tourism in a port of call are related to the expenditure incurred by passengers, crews and shipping companies (Chen, Petrickd, Papathanassise, & Li, 2019; Tattara, 2014).

The direct expenditure by cruisers during a stopover usually includes spending on one or several of the following categories: tours, museum visits and other entertainment and cultural activities; cafeterias and eating out; shopping (souvenirs, clothing and footwear, etc.); local city transport, and so on (Vayá, Garcia, Murillo, Romaní, & Suriñach, 2018). An understanding of the different types of expenditure, as well as the quantities purchased, will allow policy actors and local entrepreneurs to better design suitable marketing strategies, enabling them to understand the profiles, expectations and market-based needs of cruise passengers. Thus, entrepreneurs and sellers will be able to access essential information to direct their efforts towards local products or services included in one category or another to maximize the passengers' expenditure onshore.

As our literature review (see Section 2) shows, only a few studies exist that analyze cruiser expenditure (through econometric techniques) taking into account different expenditure categories, but none of these consider the potential presence of correlations (simultaneity) between those expenditure categories. That is, these studies do not consider the possibility that the total amount spent in one category could influence the total amount spent in the others. This is an important issue because if this correlation exists and if it is not considered in the model estimated, the results obtained will be less efficient (see, for example, Arias & Cox,

* Corresponding author at: Tourism and Transport Research Unit, Institute of Tourism and Sustainable Economic Development, Las Palmas University, Campus Universitario de Tafira, Módulo D, Las Palmas de Gran Canaria 35017, Spain.
E-mail addresses: jbanos@uniovi.es (J.F. Baños), beatriz.tovar@ulpgc.es (B. Tovar).

https://doi.org/10.1016/j.tmp.2021.100808
Received 7 July 2020; Received in revised form 28 February 2021; Accepted 14 March 2021

2001). Moreover, these correlations provide useful information regarding the relationship between expenditure categories (complements/substitutes) that better orient not only policy actions but also marketing strategies looking to increase the impact of this kind of tourism on the local economy.

The present study fills this gap in the literature by estimating a multivariate tobit system, in which decisions on different types of onshore expenditures of cruise passengers are analyzed simultaneously. We use a large dataset of ship passengers who disembarked in the Archipelago of the Canary Islands over six cruise seasons from 2001 to 2015. Data on tourists' expenditure at each port of call were compiled via survey responses. We gathered data regarding per capita expenditure for five categories: shopping, food and beverage, transport (taxis and ground transport), tours and cultural activities.

The aim of the paper is twofold. Our first goal is to identify whether there are correlations between the expenditure categories considered. This identification is important for choosing the most appropriate econometric model and for identifying, if these correlations are confirmed, what type of relationship (complements/substitutes) exists between expenditure categories. The second goal is to ascertain whether the identified drivers (country of residence, demographic features, socioeconomic status, etc.) differ between expenditure categories. In this way, this study contributes to designing practices that will ensure the success of stopovers by increasing the potential for achieving and maintaining a higher expenditure onshore. This can be done by using the results to design more personalized marketing strategies to better reach different customer segments, which would lead to a greater local economic impact. In terms of geographical scope, this study is based on scheduled cruise itineraries and includes all the Canary Islands except the islands of El Hierro and La Graciosa. It should be noted that the Canary Islands are one of the main destinations in the European tourism market (see, for example, Díaz-Pérez, Bethencourt-Cejas, & Álvarez-González, 2005; Pérez-Rodríguez & Ledesma-Rodríguez, 2019).

2. Literature review

Despite the fact that in recent decades, the cruise business has represented one of the most rapidly expanding economic segments in the tourist sector, the industry also faces many challenges in terms of the higher concern regarding cruise ships' environmental impact (i.e., air pollution and waste), especially in port cities, and more recently, concerns regarding COVID-19.[1] Indeed, studies on the environmental cost and eco-efficiency of in-port vessel emissions and their derived external costs, related not only to every type of ship but also to cruise traffic, can be found in the recent literature (Tichavska & Tovar, 2015a, 2015b, 2017; Tovar & Tichavska, 2019; Tichavska, Tovar, Gritsenko, Johansson, & Jalkanen, 2019).

Moreover, the availability of an extensive range of onboard entertainment, recreational, personal and commercial services, plus the shorter stopovers enjoyed by cruise passengers (Larsen, Wolff, Marnburg, & Øgaard, 2013), have raised questions as to the real net benefits of the business from the standpoint of the local population and government (Klein, 2002). One of these questions relates to the distribution of value that cruise tourism generates as well as how much of this value, if any, actually remains in the port of destination (Del Chiappa, Lorenzo-Romero, & Gallarza, 2018; Lopes & Dredge, 2018; MacNeill & Wozniak, 2018). This last issue, added to the environmental and social impacts derived from cruise activity in a destination, has motivated various studies focused on the attitudes of port city residents towards the development of the cruise industry (for example, Brida, Del Chiappa, Meleddu, & Pulina, 2014; Del Chiappa & Abbate, 2016; Tovar, Espino, & Lopez-del-Pino, 2021).

Ceteris paribus, an increase in cruise passenger expenditures at a stopover will positively impact the local economy, although this effect could be reduced if onshore activities are offered by the cruise line company affiliates (Rodrigue & Notteboom, 2013) or if the cruise lines retain a sales margin from local agencies (Brida & Zapata, 2010; Gui & Russo, 2011). Additionally, it is paramount to study not only total cruiser expenditures but also the sort of product or service acquired, together with those factors that could potentially influence these purchases, one of these being the possible correlation between different expenditure categories.

The analysis of cruise ship passenger spending patterns through econometric techniques has been undertaken by several studies; in some of them, the total expenditure is considered, whereas other papers focus on different expenditure items. The first group includes studies such as Pino and Tovar (2019), Brida, Fasone, Scuderi, and Zapata-Aguirre (2014), Brida and Risso (2010), Cuéllar-Río and Kido-Cruz (2008), Domènech, Gutiérrez, and Anton Clavé (2020), Gargano and Grasso (2016), Henthorne (2000), Lynch (2004), Marksel, Tominc, and Bozicnik (2017) and Parola, Satta, Penco, and Persico (2014), which have been recently summarized by Pino and Tovar (2019). Brida, Bukstein, et al., (2012), Brida, Pulina, et al., (2012), Brida, Bukstein, & Tealde (2015), Lee & Lee (2017), and Risso (2012) scrutinized these latter papers in-depth because the present study belongs to this second group. Table 1 below summarizes their main characteristics.

The fact that the first paper focusing on different expenditure categories was published in 2012 clearly indicates that the related literature is relatively novel at present. All the studies involve data collection using face-to-face interviews carried out via a questionnaire to cruise passengers on their offshore stops. Authors such as Brida et al. (Brida, Bukstein, et al., 2012; Brida, Pulina, Riaño, & Zapata-Aguirre, 2012) have designed their own ad hoc questionnaires, while other studies—four out of six—have instead taken advantage of external databases compiled by others (Risso, 2012; Brida et al., 2015; Lee & Lee, 2017; the present study).

Out of the six studies, four have included more than one port of call (Brida et al., 2015; Lee & Lee, 2017; Risso, 2012; the present study), all of them situated in the same country. With respect to the period of analysis, four articles considered a single season, whereas the other two analyzed more than one (Risso, 2012; the present study). Last, regarding the respondents questioned, four articles consider only cruise passengers, while two studies also include cruise crews (Brida et al., 2015; Brida, Pulina, et al., 2012).

Moreover, with respect to strategies for selecting samples, studies tend to be divided between those using the convenience random sample (Brida, Pulina, et al., 2012), the focal sampling method (Brida, Bukstein, et al., 2012) or the two-step stratified procedure (Brida et al., 2015; Lee & Lee, 2017; Risso, 2012 and the present study).

In terms of the model used here, the literature review discusses articles that examine those passenger and trip characteristics that best explain the probability of spending or not for each passenger expenditure category considered. For this purpose, the regression models chosen are OLS (Brida, Bukstein, et al., 2012), logit models (Brida et al., 2015; Brida, Pulina, et al., 2012) and probit models (Lee & Lee, 2017). Furthermore, five out of the six studies examine which characteristics best explain the amount of expenditure for each category using tobit models (Brida, Pulina, et al., 2012, Brida et al., 2015 and the present study), a Heckman model (Risso, 2012) or an ordered probit model with sample selection (Lee & Lee, 2017). Finally, all of the studies assume that the probability of incurring expenditure in one particular category is independent of the probability of incurring expenditure in the other categories. This paper contributes to the literature because it is the first in which the possible correlation between passenger expenditure categories is taken into account. To do this, a multivariate tobit system for cruise passenger expenditure is estimated.

In relation to the passenger expenditure categories considered, three

[1] "No cruise ships? No problem, Say Some Cities" https://www.bloomberg.com/news/articles/2020-05-20/no-cruise-ships-no-problem-say-some-cities (Accessed 03/07/2020).

Table 1
Papers using econometric techniques to explain cruise passenger's expenditure categories.

Study	Data	Dependent V (OUE)	Methodology	Independent V
Brida, Pulina, et al., (2012	– Port: Cartagena de Indias – Country: Colombia – Period: October–December – Year = 2009 – 402 questionnaires – Population = cruise passengers over 18	Four PCEC: – Accommodations, (402 TO) – Food and beverage, (402 TO) – Transport, (402 TO) – On Board, (381 TO) DBCB = Authors	SE: Focal sampling method For each PCEC: – OLS model – Tobit model	– Age, -Civil status – Education level – First time cruising – First time visitors – Gender – Group size – Income level – Nationality – Number of visit – Stayed in Cartagena – Time in Cartagena – Transport – Visit City Center
Brida, Bukstein, et al., (2012)	– Port: Cartagena de Indias – Country: Colombia – Period: October–November – Year = 2009 – 1,361 questionnaires – Population = cruise passengers and crew (over 18)	Four PCEC: – Tours, (743 TO) – Food and beverage, (743 TO) – Souvenirs, (743 TO) – Jewelry, (750 TO) DBCB = Authors	SE: Convenience random sample of visitors For each PCEC: – Tobit model – Logit model	– Age, – First time cruising – Gender – Group size – Hours offshore – In group – Income level – Number of previous cruises – US resident dummy – Visited Ciudad Vieja
Risso (2012)	– Ports: Montevideo, Punta del Este – Country: Uruguay – Period: November–March – Year = 2008/2009 – 1803 questionnaires – Year: 2009/2010 – 3348 questionnaires – Population = cruise passengers	Three PCEC: – Food: 2008/09, (380 UO) – Food: 2009/10, (661 UO) – Total: 2008/09 (1522 UO) – Total: 2009/10 (2803 UO) – Shopping: 2008/09 (557 UO) – Shopping: 2009/10 (1114 UO) DBCB = the Uruguayan Tourism Board	SE: a two-step stratified approach. For each PCEC: – Tobit model – Heckman model	– Age – Dislike price – First time visitors – Gender – Like – Nationality – Number of visit – Occupation
Brida et al., 2015	– Ports: Montevideo, Punta del Este – Country: Uruguay – Period: November–March – Year: 2009/2010 – 3,348 questionnaires – Population = cruise passengers and crew (over 18)	Four PCEC: – Food and beverage – Logit: (3348 OT) – Tobit: (2686 CO, 662 UO) – Tours – Logit: (3348 OT) – Tobit: (3118 CO, 230 UO) – Transport – Logit: (3348 OT) – Tobit: (3271 CO, 77 UO) – Shopping – Logit (3348 OT) – Tobit: (2234 CO, 1114 UO) – Total – Logit: (3348 OT) – Tobit: (546 CO, 2802 UO) DBCB = the Uruguayan Tourism Board	SE: Two-step stratified approach. For each PCEC: – Logit model – Tobit model	– Age – Dislike prices – Gender – Group size – Montevideo port arrival – Nationality – Number of visit Cities visited: – Montevideo – Punta del Este – Colonia
Lee and Lee (2017)	– Ports: Busan, Jeju, Yeosu, Incheon – Country: South Korea – Period: May–October – Year: 2012 – 1,805 questionnaires – Population: foreign cruise passengers	One PCEC: – Shopping in the shore excursion (912 UO) DBCB = Korea Tourism Organization.	– SE: Two-step stratified approach. – Ordered probit model with sample selection	– Age – Gender – First time visitors – Occupation – High income – Nationality
Present study	– Port: Fuerteventura, Gran Canaria, La Gomera, Lanzarote, La Palma and Tenerife – Country: Spain (Canary Islands) – Period: Collected annually – Years: 2001–2002, 2003–2004, 2004–2005, 2008–2009, 2011–2012, 2014–2015. – 12,578 questionnaires – Population = cruise passengers	Five PCEC: – Food and beverage – Tobit: (5395 CO, 7064 UO) – Tours – Logit: (3348 OT) – Tobit: (10,683 CO, 1778 UO) – Transport – Tobit: (5808 CO, 7064 UO) – Shopping – Tobit: (5262 CO, 7199 UO) – Cultural activities – Tobit: (5662 CO, 7199 UO) DBCB = EDEI commissioned by the island Government	– SE: Two-step stratified approach. – It is not assumed that the probability of spending in one category is independent of the other ones. – Multivariate tobit system estimation for cruise passengers' expenditure.	– Age – Age square – Gender – Socioeconomic status – Previous cruises – Group composition – First Visit Canary Islands – Cruise season – Nationality – Port of call

Note: V = Variable; PCEC = per capita expenditure categories; OUE = Observations used in the model estimation; O = observation, CO = Censored observation, UO = Uncensored observation; SE = Sampling strategy; DBCB = Database constructed by.

out of six studies include four categories (Brida et al., 2015; Brida, Bukstein, et al., 2012; Brida, Pulina, et al., 2012), and the other three include one (Lee & Lee, 2017), three (Risso, 2012) and five (the present study). Several categories are used in almost all the studies, such as food (five), beverage and tours (four out of the six) and transport and shopping (three out of the six). This paper is the first to include spending on cultural activities as a passenger expenditure category.

Last, with respect to the principal independent variables, age, gender, nationality and group size are the most common for almost all studies. It should be noted that these are also relevant factors influencing tourism consumer behavior in general (Cohen, Prayag, & Moital, 2014; Moutinho, 1987).

3. Data

The Canary Islands could be described as a "cruise island cluster" since islands with completely different characteristics are situated at short distances from each other (Stefanidaki & Lekakou, 2012). As a destination for cruise tourism, the archipelago has been promoted by the Canary Islands government, which has tried to encourage cruise passengers to spend more time at destinations as a means of increasing their onshore expenditure and, as a result, the local economic impact derived from this industry.

Since March 2020, due to the COVID-19 pandemic, cruise ships have been banned from Spanish ports. Afterwards, several companies have negotiated the activation of the Autumn-Winter cruise season only for the Canarian ports. Seven months ago, since the closure, the Canary Islands Government stated that it was vital for its economy to restart cruise ship traffic and gave the go-ahead for these vessels to resume operations between its ports from 5 November 2020.[2] The authorized ships should comply with the new health standards set by the regional authorities.[3]

The two Canary Island Port Authorities[4] have commissioned various studies that have been designed to improve knowledge of both the impact of the regular presence of cruise ships in port cities and their more general effects on the islands of call.[5] At the beginning, three specific objectives were defined: providing a description of the current organization of the cruises' activities and gathering assessments of the destinations from operators, as well as from cruise passengers. In subsequent studies, these tasks have been complemented to obtain deeper knowledge about cruise ship passengers (profile, satisfaction, spending patterns, and so on) and the views of different stakeholder groups. The present paper uses data collected from these studies for its empirical estimation.

The population of each study comprises passengers who disembarked from cruise ships calling in at one or more ports of the Canary Islands. From December to May (the high cruise season), person-to-person interviews were performed. We specifically employ information from a total of 12,578 valid interviews of cruise tourists during the period 2001–2015. Table 2 shows the characteristics of each study for the six cruise seasons included in our analysis.

The questionnaire consisted of five sections, and the sampling strategy was a two-step stratified approach. (for more details, see Pino & Tovar, 2019 and Table 1). The relevant data for this paper are contained in the fourth section, which includes questions concerning cruise passenger expenditure behavior, such as how much the visitor spent per day during his/her time onshore. This expenditure comprises the amount of purchases of several items not included in the cruise: shopping, food and drink, transport (bus, taxi, car rentals, tram, and bicycles), museum fees, sightseeing and leisure services and booking organized excursions. Note that this last item is only referred to for those cases where cruise passengers buy the tour on their own during the stopover. Otherwise, such an excursion would be an onboard expenditure, which is not the topic of this paper. The survey also gathers information about sociodemographic variables such as age, gender, civil status, education level, occupation and nationality.

Cruisers allocated their overall travel expenses into those incurred onboard and those incurred onshore as well as the cruise ticket and airfare. On average, regarding the shore expenses analyzed here, cruise passengers spent €52.10 per stopover, but the maximum (€1191) and minimum (€0) figures show important variation. As shown in Table 3, the average cruise passenger expenditure by stopover (during the six seasons analyzed) also shows differences between different expenditure categories: €24.66 on shopping, €9.14 on food and beverage, €8.10 on transport, €7.24 on tours and €1.06 on cultural activities when all the observations were taken into account. Obviously, the average is higher when only positive expenditures were considered (€42.69 on shopping, €16.12 on food and beverage, €26.67 on transport, €50.77 on tours and €12.53 on cultural activities). Using the retail price indices for the Canary Islands, these monetary variables were deflated to 2016 prices to adjust for inflation. The Canary Islands Consumer Price Index (CPI) group series "Clothing and footwear" was used for the shopping category deflator, the CPI group series "Restaurants" for food and beverage, the CPI subgroup "Transport services" for transport and tours, and the CPI subgroup "Recreational and cultural services" for cultural activities. Last but not least, Table 3 indicates the presence of a large portion of null observations in all the cruiser expenditure categories in the sample.

In accordance with the literature review in Section 2, the variables used to explain the determinants of the different types of cruise passenger expenditure in this paper have been grouped into the following two categories: sociodemographic attributes (age, gender, socioeconomic status and country of residence) and travel-related features (group composition, previous cruise experiences, first visit to the Canary Islands, cruise season and port of call). Table 4 provides some descriptive statistics for this set of explanatory variables.

4. Methodology

Consumer behavior has been analyzed not only in general marketing studies (Al-Tarawneh, 2012; Hawkins & Mothersbaugh, 2010) but also in tourism research (Baker & Crompton, 2000; Cohen et al., 2014; Sirakaya & Woodside, 2005) and, more recently, for the cruise industry (Hung, Lee, Wang, & Petrick, 2020; Hung & Petrick, 2011; Petrick, 2004).

Various studies have analyzed the influence of several factors on the

[2] Since the beginning of November 2020, TUI Cruises have been operating permanently in the Canary Islands, while Aida and Happag Lloyd's operate intermittently.

[3] The conditions include an insurance policy to cover possible incidents related to COVID-19 among the passengers while they operate in the Canary Islands. The cruise lines have also been required to enter into agreements with hospitals and hotels on each of the islands, in case it is necessary, to activate a quarantine, in addition to a special hygiene plan for ships and the hiring of health personnel. Moreover, cruise passengers must fill out a form that includes all their movements in the last 15 days before arriving in the Canary Islands so that they can be monitored in case of an incident, and confirm if they have been in contact with someone who has tested positive for Covid or if they have been tested positive in a recent diagnostic test.

[4] The Canaries comprise the Spanish provinces of Las Palmas and Santa Cruz de Tenerife, each one having four main islands (the rest of the archipelago is made up of a host of smaller islands, islets and roques). Main ports in the Canary Islands are managed by different Port Authorities, one for each province. For a detailed analysis of the port management model in Spain, see Rodríguez-Alvarez and Tovar (2012) and Tovar and Wall (2014, 2021a, 2021b).

[5] Currently, cruise ships call on all main islands except one (La Graciosa).

Table 2
Characteristics of each Market Study on Cruise Tourism study.

Cruise season	2001–02	2003–04	2004–05	2008–09	2011–12	2014–15
Sample (n° questionnaires)	1613	2389	2421	2031	2000	2124
Sample error	0.0244	0.0200	0.0199	0.0217	0.0219	0.0212

Table 3
Cruiser's expenditure categories. Descriptive statistics.

Expenditure	Shopping	Food and beverage	Transport	Tours	Cultural activities
Mean (2016 euros)	24.66	9.14	8.10	7.24	1.06
Std. Dev.	44.87	17.47	20.45	24.06	5.91
Min	0.00	0.00	0.00	0.00	0.00
Max	1174.74	371.29	302.11	431.59	188.71
Mean (2016 euros) if expenditure > 0	42.69	16.12	26.67	50.77	12.53
N° null expenditure observations	5262	5397	8678	10,683	11,408
% null expenditure observations	42.23	43.31	69.64	85.73	91.55

Table 4
Explanatory variables and descriptive statistics.

Socioeconomic characteristics		Trip-related characteristics	
Age (mean years)	55.81	**Group composition** (%)	
		Alone	5.21
Age square (mean years)	3295.03	With a partner	62.21
		With the family	13.64
Gender (%)		With friends	18.94
Male	41.14	**Previous cruises** (mean number)	4.19
Female	51.86	**First visit Canary Islands** (%)	
		No	48.70
Socioeconomic status (%)		Yes	51.30
Low	11.24	**Cruise season** (%)	
Low-medium	33.04	2002/2003	12.62
Medium	45.36	2003/2004	19.00
Medium-high	6.91	2004/2005	19.00
High	3.46	2011/2012	16.04
		2014/2015	17.05
Origen (%)			
British	43.49	**Port of call** (%)	
Spanish	2.01	Lanzarote	22.98
German	34.48	Santa Cruz de Tenerife	22.56
North American	3.66	Santa Cruz de La Palma	20.01
Italian	4.37	Las Palmas	20.50
Other European	10.18	Puerto del Rosario	9.24
Rest of the world	1.83	La Gomera	4.71

Note: Numbers indicate percentages when not otherwise specified.

purchase behavior intentions of cruise passengers: satisfaction (Brida, Lanzilotta, Moreno, & Santiñaque, 2018; Parola et al., 2014), motivation (Andriotis & Agiomirgianakis, 2010), affective factors (Duman & Mattila, 2005), quality (Petrick, 2004), critical incidents (Petrick, 2006), brand perception (Ahmed, Johnson, Ling, Fang, & Hui, 2002; Li & Petrick, 2008) or price sensitivity (Petrick, 2005).

The present work focuses on the economic benefits that cruise tourism generates in a port of call, which is related to the money spent by passengers because, ceteris paribus, an increase in cruiser expenditure during a stopover will inevitably have some type of direct impact on the local economy. For this reason, many studies analyze cruise passengers' spending patterns, but as our survey showed, only a few take into account different expenditure categories. To the best of our knowledge, no study exists that considers the interdependency across the equations that explain those expenditure categories.

According to the neoclassical theory of consumer behavior (Deaton & Muellbauer, 1980), adapted by Syriopoulos and Sinclair (1993) to tourism economics, it is unrealistic to assume that cruise passenger shore expenditure among different categories (shopping, food and beverage, transport, tours, cultural activities) are independent. Curiously, as Disegna and Osti (2016) have stressed, there are very few studies in the literature that have analyzed the interrelationship between the different categories of tourist expenditure made during a trip, with Bilgic, Florkowski, Yoder, and Schreiner (2008) and Divisekera (2010) constituting the only outstanding exceptions. Furthermore, until the present research, the possible correlations among the goods and services forming part of cruise passenger expenditure incurred at a port of call has not been considered (see, for example, Brida, Bukstein, et al., 2012, Brida, Pulina, et al., 2012, Brida et al., 2015).

Following Disegna and Osti (2016), Divisekera (2010) and Syriopoulos and Sinclair (1993), we assume that the cruise passenger's utility function is weakly separable and that his/her decision-making process goes through three stages. Initially, consumers allocate their budget between taking cruise holidays and other goods and services (including other tourist activities). In the second stage, tourist spending is allocated between different cruise products. In this sense, Whyte (2018) has highlighted the relationship between cruise ships and ports of call as co-destinations, since not only onboard but also onshore attributes are considered by cruise tourists when purchasing a cruise vacation. Finally, in the third stage, cruise passengers allocate their expenditure onshore between the different goods and services offered at the destination. For the remainder of the present study, we will focus on this third stage, where the willingness to spend on a certain category may be correlated to spending on another category.

Since all the components of the different types of cruise passenger expenditure are censored at zero, we have chosen to estimate a tobit-type model to explore the determinants of expenditure. Indeed, as can be appreciated in Table 3, our data are characterized by several observations with zero expenditure. Thus, the censoring rates for expenditure on food and beverage, shopping, tours, transportation, and cultural activities are 43.31%, 42.23%, 85.73%, 69.64% and 91.55%, respectively.

As is well known, the tobit model is a useful econometric tool for addressing the problem of censoring in the dependent variable (left-censored at zero in the present work). Consequently, the cruise ship passenger spending patterns can be written as an *M*-equation multivariate tobit system:

$$y^{*}_{im} = x_{im}\beta_{m} + \varepsilon_{im}$$

$$y_{im} = max\left(y^{*}_{im}, 0\right), m = 1, \ldots, M \quad (1)$$

where y_{im}* is a latent variable for the *m*th type of spending carried out by the *i*th cruise ship passenger, which is a function of a vector of explanatory variables x_{im} (sociodemographic and trip-related characteristics). β_m is the set of coefficients to be estimated, y_i measures the observed expenditure, M is the number of tourist expenditure categories and ε_{im} is the error term, $\varepsilon_i \sim N(0, \sigma^2_m)$.

We assume that the vector of error terms $[\varepsilon_{i1}, \varepsilon_{i2}, \ldots, \varepsilon_{iM}]$ follows a multivariate normal distribution with mean zero and variance-covariance matrix Σ. It should be noted that if there were no cross-equation correlations, expression (1) could be estimated consistently equation by equation using a univariate tobit model. However, given

that decisions about the M different types of cruise passenger expenditure are usually determined simultaneously, the error terms ε_{im} in (1) are likely to be correlated. Then, efficiency gains occur if the *M*-equations are estimated jointly as a system.

The likelihood function for the system of *M* censored equations for an observation or, equivalently, for the expenditure pattern of a cruise passenger, can be written as:

$$\int_{-\infty}^{-X_1\beta_1} \dots \int_{-\infty}^{-X_M\beta_M} f(\varepsilon_1, \dots, \varepsilon_M) d\varepsilon_1 \dots d\varepsilon_M = \int_{-\infty}^{-X_1\beta_1} \int_{-\infty}^{-X_2\beta_2} \dots \int_{-\infty}^{-X_5\beta_5} f(\varepsilon_1, \varepsilon_2, \dots, \varepsilon_5) d\varepsilon_1 \dots d\varepsilon_5 \quad (2)$$

where f is the multivariate normal density function and, in our case, M = 5. As can be seen, the parametric estimation of system (1) requires evaluating definite integrals in up to five dimensions, which raises an important computational problem. In this paper, we apply a simulation method to resolve this issue, and among the different existing techniques (see, for example, Cappellari & Jenkins, 2006; Greene, 2003; Train, 2009), we use the Geweke–Hajivassiliou–Keane (GHK) simulator (Geweke, 1989; Hajivassiliou & McFadden, 1998; Keane, 1994).

The GHK maximum simulated likelihood estimator considers that the joint multivariate normal distribution can be replaced with the product of sequentially conditioned univariate normal distribution functions, which can be calculated more easily even though doing so is computationally expensive in relative terms. The GHK simulator performs draws from upper-truncated univariate normal distributions and then recursively uses the Cholesky factorization to compute the multivariate probability distribution.

Therefore, this maximum simulated likelihood approach will allow for estimates of the multivariate tobit system for the different categories of tourism expenses, taking into account the possible cross-equation correlations. That is, the GHK procedure allows us to estimate the β_m coefficients for each M-equation along with the cross-equation correlations and the variance of the error terms. We estimated the multivariate tobit using the Stata mvtobit program developed by Barslund (2015).

Then, once the variance-covariance matrix Σ is estimated,

$$\Sigma = \begin{pmatrix} \sigma_1^2 & \rho_{21}\sigma_1\sigma_2 & \rho_{31}\sigma_1\sigma_3 & \rho_{41}\sigma_1\sigma_4 & \rho_{51}\sigma_1\sigma_5 \\ \rho_{12}\sigma_1\sigma_2 & \sigma_2^2 & \rho_{32}\sigma_2\sigma_3 & \rho_{42}\sigma_2\sigma_4 & \rho_{52}\sigma_2\sigma_5 \\ \rho_{13}\sigma_1\sigma_3 & \rho_{23}\sigma_2\sigma_3 & \sigma_3^2 & \rho_{43}\sigma_3\sigma_4 & \rho_{35}\sigma_3\sigma_5 \\ \rho_{14}\sigma_1\sigma_4 & \rho_{24}\sigma_2\sigma_4 & \rho_{34}\sigma_3\sigma_4 & \sigma_4^2 & \rho_{45}\sigma_4\sigma_5 \\ \rho_{15}\sigma_1\sigma_5 & \rho_{25}\sigma_2\sigma_5 & \rho_{35}\sigma_3\sigma_5 & \rho_{45}\sigma_4\sigma_5 & \sigma_5^2 \end{pmatrix}$$

where each $\rho_{jk} = \rho_{kj}$ off-diagonal element is the correlation between the error terms, and we can test the cross-equation dependence. Thus, in our application, the five types of cruise passenger expenditure are independent if and only if $\rho_{12} = \rho_{13} = \rho_{14} = \rho_{15} = \rho_{23} = \rho_{24} = \rho_{25} = \rho_{34} = \rho_{35} = \rho_{45} = 0$.

5. Results

In this section, we report the results of the proposed econometric model used to analyze the five categories of cruise passenger expenditure in the Canary Islands. Before discussing the parameter estimates, Table 5 is presented, which shows the correlation in the error terms among the possible combinations of the five categories of cruise passenger expenditure during a stopover, estimated using the multivariate tobit model. As can be observed in this table, all correlation terms are significantly different from zero at the 1% significance level, justifying the use of a multivariate tobit system to estimate cruise passenger spending. That is, the tobit system will provide a more efficient estimation than will estimating each univariate tobit expenditure equation separately. In addition, the null hypothesis that all the pairs of covariance parameters are jointly equal to zero is also strongly rejected (log-likelihood ratio test: $\chi^2(10) = 1812.81$), reinforcing the assumption that the error terms are correlated across equations.

It should be noted that the positive/negative correlation coefficient for the disturbance terms of two expenditure categories means that the unobservable factors that increase/decrease one of these types of cruise passenger expenditure also increases/decreases the other. The positive correlation coefficient between the disturbance terms of the shopping and the food and beverage equations (0.25), shopping and transport equations (0.24), shopping and cultural activities equations (0.22), and transport and cultural activities equations (0.32) implies that these categories of cruise passenger spending are complementary. Equally, the food and beverage component also complements transport and cultural activities, although with smaller correlation magnitudes. However, the correlation is negative between tours and food and beverage (−0.09), between tours and shopping (−0.05), and especially between tours and transport (−0.29), indicating that spending on tours acts as a substitute for the other spending components.

Once the existence of correlations between the categories of expenses considered has been verified, we continue to investigate and discuss the determinants of the five categories of cruise passenger expenditure. The results obtained from the maximum simulated likelihood estimator for the multivariate tobit system (see Table A1 in Appendix A) reveal that most of the explanatory variables are statistically significant for all expenditure categories.[6] However, for the gender, cruise season, and port of call variables, the sign of their effect varies depending on the expenditure category analyzed.

Moreover, with the aim of comparing the results of the multivariate tobit system with those of the previous literature, the univariate tobit regressions (five separate tobit equations, one for each type of expenditure) were also estimated without allowing for correlations between the equations. The Maddala pseudo-R2 was calculated to check the goodness-of-fit between the system and each of the equations separately (Veall & Zimmermann, 1996). By comparison, the Maddala pseudo-R2 of 0.272 for the multivariate tobit is larger than the values of 0.053, 0.064, 0.019, 0.063 and 0.046 for the univariate "Shopping", "Food and beverages", "Tours", "Transport" and "Cultural activities" equations, respectively, which clearly supports the system specification.

On the other hand, it should be noted that a continuous variable for income is not available in the database because the survey designers decided not to include a question about income, not only to avoid problems derived from the high rates of nonresponse but also due to a likely high percentage of unreliable answers. Therefore, to circumvent the aforementioned problems, the designers opted for an alternative method for determining the purchasing power of cruise passengers, which consists of using socioeconomic status as a proxy for income.[7] The socioeconomic status variable is derived from both the respondent's education and occupation level. Given an occupation level, a higher

[6] One of the typical explanatory variables used when analyzing cruisers' expenditures is tourist destination satisfaction. When this variable was included in our analysis all the estimated coefficients were positive, indicating that satisfaction is a key element to incentivize cruise passenger consumption. This is because traveler satisfaction leads to an increase in expenditure during stopovers, confirming the previous results in the literature (see Brida et al., 2018 or Parola et al., 2014). However, it should be noted that this variable could generate endogeneity problems, so we decided to exclude it from the present model.

[7] It should be noted that the use of proxies of income is something usual (see, for example, Brida, Fasone, et al., 2014).

Table 5
System correlated errors.

Correlation	Shopping	Food and beverage	Tours	Transport	Cultural activities
Shopping	1.0000				
Food and beverage	0.2491***	1.0000			
Tours	−0.0448***	−0.0945***	1.0000		
Transport	0.2444***	0.1215***	−0.2961***	1.0000	
Cultural activities	0.2208***	0.1110***	0.0808***	0.3242***	1.0000

Note: *, ** and *** indicate statistical significance at 10%, 5% and 1%, respectively.

degree of education is linked to a higher socioeconomic status among one of the five categories considered (low, low-medium, medium, medium-high and high). Our results show that all the coefficients linked to this variable are positive and statistically significant (except for transport), which means that the higher one's social status is, the higher that person's expenditure.

6. Discussion and managerial implications

To facilitate the interpretation of the results, the marginal effects of the explanatory variables on the expected values of all observed expenditure, computed at the sample means, together with their associated t-values are calculated for both models (Table 6). These marginal effects, $\partial\ E(y_m|x)\ |\ \partial\ x$, are the changes in the dependent variables expressed in Euros.

As shown in the table, except for "food and beverages", for the rest of the four cruise ship expenditure categories, the independent tobit models either underestimate or overestimate the magnitude of the marginal effects. This is especially relevant in the case of "cultural activities" and "tours", where the marginal effects of the univariate tobit model represent 10% and 20%, respectively, of those of the multivariate system, while for "transport", they account for 40%. In contrast, for "shopping", the univariate model overestimates the magnitude of the marginal effects by almost 35%. This is evidence of the bias that can be incurred by ignoring correlations across expenditure equations, with implications for economic policy recommendations.

The estimated effects of the multivariate tobit system suggest that an additional year added to the average age of the tourists (55.8) reduces cruise passenger expenditure on shopping by €0.41, on food and beverage by €0.09, and on transport by €0.11. However, the positive and significant coefficient on age and the negative and significant coefficient on age squared for the shopping, food and beverages and transport equations (Table A1) indicate that the true relationship between these expenditures and age takes the form of an inverted U-shape. We have confirmed this hypothesis by checking that the turning point of the curves falls within the range of data (see Assaf & Tsionas, 2019). In this sense, the marginal effects for age rise initially until it reaches these turning points (at age 31.5 in shopping, at age 37.9 in food and beverages and at age 38.9 in transport), and afterward, a negative relationship prevails. This finding that age exerts an inverted U-shaped curvilinear effect on tourist expenditure is consistent with previous studies (Nicolau & Más, 2005 or Thrane & Farstad, 2012). Our result also echoes the findings of Brida, Bukstein, et al. (2012) and Brida, Pulina, et al. (2012) for cruise passengers' expenditure in Cartagena de Indias (Colombia), which conclude that older tourists spend less on food and drink, souvenirs or transportation. This result suggests that policies that encourage the arrival of younger cruise tourists through specific marketing strategies could increase onshore expenditure.

Interestingly, we have found that there are significant differences in spending patterns between men and women on shopping, food and beverages, tours, and, to a lesser extent, cultural activities. Thus, while men spend €1.10 more than women on food and beverage and €3.69 more on tours, they spend less on shopping (€4.01). These results contrast with most previous studies, which highlight that gender is not an influencing factor in travel spending, such as in Jang, Bai, Hong, and O'Leary (2004) for the case of Japanese travelers to the United States, in Wang, Rompf, Severt, and Peerapatdit (2006) for visitors to Northern Indiana (except in the category of entertainment expenditures) and in Marrocu, Paci, and Zara (2015) for tourists who spent their holidays in Sardinia (Italy). However, the positive relationship we found between female cruisers and shopping expenditure is in line with the results of Kim et al. (2011) for visitors to Macau (China) and with that of Risso (2012) for cruise passengers in Uruguay during the 2008–2009 season. Furthermore, the result that female cruisers spend less than males on food and beverages is in keeping with the findings of Brida et al. (2015; Brida, Bukstein, et al., 2012). Therefore, it seems that gender-oriented marketing strategies classified by expenditure categories should be more efficient than generalized strategies.

On the other hand, socioeconomic status has positive effects on the expenditure patterns of cruise ship passengers. Our results suggest that a tourist with a high socioeconomic status, relative to individuals with lower status, spends on average €5.32 more on shopping, €9.56 more on tours or €6.36 more on cultural activities. This finding of a positive relationship between cruise tourist expenditures and socioeconomic status, a proxy of household income, is consistent with most previous research (see, among others, Lee & Lee, 2017 for cruise passengers in Korea).

Regarding the trip-related variables, except in the case of tours, we estimated a positive marginal effect associated with traveling in a group. For example, we must highlight that compared to individuals who travel alone, those who travel with the family will spend €12.97 more on shopping and €7.66 more on transport. Thus, traveling with family or friends significantly increases expenditure per capita onshore on food and beverages and transportation, which agrees with the results reported by Brida et al., 2015 for the expenditure patterns of cruise ship passengers at the ports of call of Montevideo and Punta del Este (Uruguay). Nevertheless, the number of previous cruises does not have any effect on expenditure (except for shopping), in line with the findings of Marksel et al., 2017.

Other travel-related characteristics, such as being a first-time visitor versus a repeat visitor, have also been analyzed in the literature on tourism spending and lead to contradictory conclusions. Our result that first-time visitors to the Canary Islands spend more on tours (€8.39) is in accordance with what Oppermann (1996) obtains for Rotorua (New Zealand), Alegre and Juaneda (2006) for the Balearic Islands and Brida et al. (2015) for cruise ship passengers in Uruguay. Moreover, the positive relationship we found between repeat cruise passengers in the Canary Islands and increased spending on food and beverages is consistent with the findings of Dayour, Adongo, and Taale (2016) for tourists in Ghana, although it is the opposite of the result of Brida, Pulina, et al. (2012) for cruisers in Colombia. Consequently, it is necessary to launch customized marketing policies that take into account how these sociodemographic characteristics affect the different cruise passengers' expenditure categories at the port of call.

Furthermore, our results also show the reduction in all categories of expenditure that occurred in the 2008–2009 season, holding constant the other explanatory variables, which is associated with the effect of the global financial crisis and is in line with, for example, the study of Eugenio-Martin and Campos-Soria (2014) that analyzed the reduction in tourism expenditure in the EU-27 during this period. Because of this, the

Table 6
Marginal effects for cruise passengers' expenditure: multivariate tobit system vs. univariate tobit models.

Explanatory variable	Shopping		Food and beverages		Tours	
	MST	UT	MST	UT	MST	UT
Socioeconomic characteristics						
Age (years)	−0.4134***	−0.5560***	−0.0958***	−0.0955***	0.0031	0.0002
Gender (ref. male)	−4.0109***	−5.4196***	1.1014***	1.1419***	3.6981**	0.8590**
Socioeconomic status (0 = low, 1 = low-medium, 2 = medium, 3 = medium-high, 4 = high).	1.3301**	1.8116**	0.2461*	0.2592*	2.3998**	0.5142**
Trip related characteristics						
Previous cruises (number)	0.1701**	0.2356*	0.0281	0.0289	−0.2199	−0.0481
Group composition (ref. alone)						
With a partner	8.1130***	10.9101***	1.8320***	1.7678***	2.5002	0.5627
With the family	12.9674***	17.6355***	2.2665***	2.1828***	5.7015	1.3156
With friends	10.3750***	14.0140***	2.7328***	2.6725***	6.7987	1.5557*
First visit Canary Islands (ref. No)	−0.5776	−0.7256	−0.7847***	−0.7917***	8.3949***	1.8842***
Cruise season (ref. 2002/2003)						
2003/2004	11.4848***	15.4646***	4.0832***	4.0076***	−2.3990	−0.4456
2004/2005	10.2126***	12.7372***	2.4351***	2.2591***	−9.9950***	−2.0852***
2008/2009	−3.9045**	−6.8027***	−3.0801***	−3.4112***	−13.0061***	−2.6412***
2011/2012	6.0896***	7.0498***	−2.8167***	−3.0974***	−25.0022***	−5.4939***
2014/2015	7.8064***	9.6467***	3.8787***	3.7358***	−16.0079***	−3.5343***
Origen (ref. English)						
Spanish	13.9082***	18.9196***	0.9899	0.9087	9.1972	2.1749*
German	−2.4776**	−3.2575**	−1.8863***	−1.8166***	3.9012*	0.8212*
North American	4.4870*	6.2256*	0.1132	0.1017	9.1953**	2.1250**
Italian	10.5872***	14.3901***	0.1114	0.0736	12.9932***	2.5971***
Other European	4.7460***	6.4433***	0.0421	0.0270	6.5000**	1.4352**
Rest of the world	11.3798***	15.9506***	0.2568	0.3825	1.7999	0.3989
Port of call (ref. Lanzarote)						
Santa Cruz de Tenerife	14.7992***	19.8074***	1.3545***	1.3476***	8.7936***	1.8920***
Santa Cruz de La Palma	0.4513	0.2921	−0.5278	−0.5903	−0.9207	−0.4540
Las Palmas	9.6469***	12.9558***	1.1260***	1.0746***	−3.4007	−0.8013
Puerto del Rosario	−3.2776*	−4.7021**	−1.2092**	−1.3092***	−4.1993	−0.9606
La Gomera	−0.4886	−1.1789	0.8299	0.7712*	0.8793	0.1173
N° obs.	12,461		12,461		12,461	
Obs. Uncensored	7064		7199		1778	

Explanatory variable	Transport		Cultural activities	
	MST	UT	MST	UT
Socioeconomic characteristics				
Age (years)	−0.1099**	−0.0507**	−0.1125	−0.0087
Gender (ref. female)	0.4233	0.2914	0.9227*	0.1330**
Socioeconomic status (0 = low, 1 = low-medium, 2 = medium, 3 = medium-high, 4 = high).	0.3771	0.2130	1.5902***	0.1366***
Trip related characteristics				
Previous cruises (number)	0.0027	0.0011	0.0117	0.0021
Group composition (ref. alone)				
With a partner	3.9630**	1.6908**	0.6672	0.0578
With the family	7.6649***	3.4170***	2.0910	0.1917
With friends	7.5005***	3.3319***	3.5387*	0.2883*
First visit Canary Islands (ref. No)	0.4603	0.1595	−0.9127	−0.0908
Cruise season (ref. 2002/2003)				
2003/2004	3.6476***	1.6531***	3.8889***	0.2812***
2004/2005	−4.3270***	−1.9529***	−8.6594***	−0.8031***
2008/2009	−9.7101***	−4.5650***	−17.3901***	−1.5901***
2011/2012	−9.0206***	−4.3183***	−15.2046***	−1.3506***
2014/2015	−8.0166***	−4.1104***	0.6116	−0.0796
Origen (ref. English)				
Spanish	−0.0107	0.0252	2.5202	0.1624
German	−0.9278	−0.4400	3.4910***	0.2967***
North American	4.5064**	2.0705**	5.5188**	0.4298**
Italian	5.1981***	2.1162**	4.9009***	0.4589***
Other European	1.1092	0.5587	2.4614**	0.1658
Rest of the world	6.3019***	3.1104***	7.7841***	0.7794***
Port of call (ref. Lanzarote)				
Santa Cruz de Tenerife	−3.0809***	−1.4675***	−3.8206***	−0.2730***
Santa Cruz de La Palma	−15.0884***	−7.2142***	0.1339	0.0159
Las Palmas	−1.3302	−0.6611*	−0.3288	−0.0442
Puerto del Rosario	−5.9915***	−2.6596***	−2.8016**	−0.2044*
La Gomera	−17.5916***	−8.2706***	−19.8043***	−1.6937***
N° obs.	12,461		12,461	
Obs. Uncensored	3783		1053	

Notes: *, ** and *** indicate statistical significance at 10%, 5% and 1%, respectively. MST = Multivariate system tobit. UT = Univariate tobit.

average passenger expenditure on cultural activities and transportation were more strongly affected, being reduced by €17.39 and €9.71, respectively, in relation to the 2002/2003 season. The negative effects extended until the 2014–2015 season, except for the average amount of expenditure on food and beverage, which increased by €3.88, and expenditures on shopping, which rose by €7.81.

Taking the United Kingdom as the reference for country of residence, the marginal effects obtained indicate that a cruise traveler from Germany spends €1.89 less on food and beverage, a Spanish tourist spends €13.91 more on shopping, an Italian cruise passenger spends €12.99 more on tours and €5.19 more on transport and a North American spends €5.52 more on cultural activities. Aguiló and Juaneda (2000), Laesser and Crouch (2006) and Thrane and Farstad (2012) likewise found that the nationality of travelers is one of the main determinants of tourism expenditure. In the field of cruise tourism, Brida et al. (Brida et al., 2015, Brida, Pulina, et al., 2012), Lee and Lee (2017) and Risso (2012) come to similar conclusions. Our results that cruise passengers from nationalities other than German tend to have a higher level of spending on shopping compared to the British are in line with those obtained in Aguiló, Rosselló, and Vila (2017) for the Balearic Islands, as is the finding that Germans spend less on food and beverages than British cruise tourists.

This result suggests that to boost onshore expenditure, marketing campaigns should be oriented to the expenditure category whose marginal effect is greatest for each nationality. For example, shopping tours for Spaniards could be organized where special incentives encourage shoppers to make more purchases, such as discounts at the shops or malls visited while on tour or discounts for the second item purchased at the same retail shop.

Finally, the marginal effects point to significant differences in cruise passenger expenditure between islands. In comparison with Lanzarote, the average expenditure on shopping is €14.79 higher in Tenerife and €9.65 higher in Gran Canaria, while spending on transport is €15.08 lower in La Palma and €17.59 lower in La Gomera.

After discussing the determinants of the five categories of cruise passenger expenditure, it is worth returning to the correlations between their disturbance terms, since these indicate whether the different types of spending are complements or substitutes. Thus, when there is a positive correlation between two items, creating joint marketing campaigns could be more effective because common unobserved factors tend to increase both categories of expenditures. Therefore, it is necessary to design activities catered to different complementary categories of cruise passenger spending, such as shopping tours around the city that include stops at restaurants, where tastings of local products are offered (tapas and wine, typical sweets, etc.) and in this way, expenditure can be reinforced.

On the other hand, when the correlation is negative, as occurs, for example, between tours and shopping, practical strategies could also be designed to reverse or at least ameliorate this effect. This negative correlation means that tour and shopping activities are substitutes, that is, cruisers who undertake a tour have lower expenditures on shopping. This could be because there are no (or only a few) opportunities for shopping during the excursion. Since these tours are to a large extent organized by the cruise companies, this situation could be changed if such tours were designed to include shopping activities. One way to facilitate these purchases could be to create guides and brochures to be handed out before/during the tour. In fact, this could be a way for cruise companies to improve residents' perceptions and attitudes towards cruise tourism's impact on the destination city (Tovar et al., 2021).

Divisekera (2009) and Divisekera and Deegan (2010) study the expenditure behavior of foreign tourists in Australia and Ireland, respectively, finding that the major groups of commodities consumed by these tourists, which include shopping, food and transport, behave as complementary goods. This would suggest that compared to cruise ship passengers, other tourists at the same destination would need to purchase all those goods and services to maximize the utility from their visit.

To sum up, these correlations, jointly considered with the marginal effects, provide important information to policy-makers, sellers and entrepreneurs to help better orient their policies and marketing strategies to maximize the impact that cruise passenger expenditure can have on the local economy. In summary, we suggest the following managerial implications that, in light of our findings, would lead to a greater impact of cruise tourism onshore:

1) Further promotion of cruises in the Canary Islands should be targeted at younger tourists and those traveling in a group.
2) Other personalized marketing strategies (gender-oriented, nationality-oriented or for first-time visitors to the Canary Islands) would need to be specific for each expenditure category. This should be more efficient than more generalized strategies and therefore should be implemented to better reach different customer segments.
3) Joint marketing campaigns should be designed for complementary expenditure categories of cruise passenger spending (for example, "shopping" and "food and beverages") so that they are more successful.

7. Conclusion and future research

The present study fills a gap in the literature by estimating a multivariate tobit system in which the decisions regarding cruise passenger expenditures measured as per capita expenditure for five categories during stopovers are analyzed simultaneously. Our results confirm the existence of correlations among the error terms of the equations for the expenditure categories considered. In addition, the goodness-of-fit measures imply that the use of a multivariate tobit system is justified and allows us to obtain more efficient estimates of the determinants of onshore cruise passenger spending, which can be useful for designing economic policies in destinations that receive cruise lines. Therefore, from a theoretical standpoint, this study provides an important contribution in terms of the proper methodology for exploring the determinants of different expenditure categories when there are several observations with zero expenditure and there are correlations among the different categories of expenditure.

Moreover, from a practical point of view, this paper has shown that it is paramount to study not only the visitors' total spending but also the factors influencing the types of goods and services purchased by cruise tourists and their cross-correlations. The knowledge of all the marginal effects derived from the factors influencing different expenditure categories allows for a more efficient design of the commercialization process by directing marketing efforts towards expenditure components that have a greater local economic impact on destinations, such as shopping and food and beverage. Moreover, marketing strategies would produce a greater effect if their design took into consideration the cross-equation correlations among expenditure categories.

We have also found strong empirical evidence on the importance of sociodemographic characteristics, such as gender, age, socioeconomic status and even nationality, to explain the determinants of the different types of cruise passenger expenditure. Consequently, it is necessary to launch customized marketing policies that take into account how these sociodemographic characteristics affect the different cruise passengers' expenditure categories at the port of call. The estimates of all these marginal effects allow for the concentration of marketing efforts on expenditure components that have a greater local economic impact on destinations.

Some limitations of this study should be considered. First, the dataset

available was collected at only a single destination (Canary Islands); thus, the results should not be generalized until further similar studies can be replicated for other destinations. Moreover, the data set was gathered before the COVID-19 pandemic, therefore, it should be noted that the results could vary due to, for example, variations in the cruiser's profile (sociodemographic characteristics). Second, it would be interesting to check whether our results might be affected by using a higher number and/or different types of expenditure. The improvement in the economic effects related to land expenditure may be addressed by exploring what new products and/or services may also be offered that have not been considered before, especially those that could also be useful for branding the port city with a local identity and providing tourists with higher quality experiences (Dai, Hein, & Zhang, 2019).

Finally, another possible avenue for future research is to extend the time span of the analysis past 2015 in order to study whether the onshore behavior of cruise passengers has changed in recent years due to, for example, variations in their geographical origin or the recent pandemic (COVID-19). It should be noted that prevention measures and new health protocols that minimize the possibility of transmission of the virus between the local population and visitors also limit cruise passengers' options for spending at a destination. Whether COVID-19 changes could last long-term is an open question. Like the rest of the travel industry, the cruise sector and local entrepreneurs are looking forward and pinning their hopes on the vaccination.

Whatever the outcome of the COVID-19 crisis, the cruise industry will have to face increasing pressure to operate sustainably. Therefore, together with the cities — and their residents — the cruise industry should develop a more sustainable tourism after the pandemic from which all sides would equally benefit. We hope the results offered in this paper could be useful to attain it.

Author contribution

Authors contributed equally to the development of the present paper.

CRediT authorship contribution statement

J.F. Baños: Conceptualization, Methodology, Formal analysis, Writing - review & editing. **B. Tovar:** Conceptualization, Methodology, Formal analysis, Writing - review & editing.

Declaration of Competing Interest

None.

Acknowledgements

The authors would like to thank the two anonymous reviewers and the editor for their insightful comments on the article. Addressing the raised points has led to the improvement of this work. The authors wish to acknowledge the help provided by Mr. Juan Francisco Martín Naranjo and Mr. Jose Luis Saavedra Alvarado who provide the data used in this paper. Financial assistance for this work was provided by Grants ECO2015-68345-R (MINECO/FEDER) and MINECO-18-ECO2017-86402-C2-1-R from the Spanish Ministry of Economy and Competitiveness and also the Project PAPI-18-GR-2011-0026 from the University of Oviedo.

Appendix A. Appendix

Table A1
Estimated System Tobit for cruise passengers' expenditure.

Explanatory variable	Shopping	Food and beverages	Tours	Transport	Cultural activities
Socioeconomic characteristics					
Age (years)	0.7254***	0.4061***	−0.0884	0.4081*	0.2180
Age square (years)	−0.0115***	−0.0054***	0.0008	−0.0052**	−0.0032
Gender (ref. male)	−5.4383***	2.2141***	5.8513**	0.6828	1.6849*
Socioeconomic status (0 = low, 1 = low-medium, 2 = medium, 3 = medium-high, 4 = high).	1.8034**	0.4948*	3.7498**	0.6072	2.0336***
Trip related characteristics					
Previous cruises (number)	0.2305**	0.0564	−0.3414	0.0043	0.0149
Group composition (ref. alone)					
With a partner	11.0002***	3.6826***	3.9066	6.3817**	0.8532
With the family	17.5822***	4.5561***	9.0071	12.3628***	2.6739
With friends	14.0673***	5.4935***	10.7234	12.0976***	4.5252*
First visit Canary Islands (ref. No)	−0.7832	−1.5774***	13.2622***	0.7425	−1.1687
Cruise season (ref. 2002/2003)					
2003/2004	15.5720***	8.2079***	−3.7660	5.8927***	4.9794***
2004/2005	13.8470***	4.8950***	−16.2520***	−6.9904***	−11.0875***
2008/2009	−5.2941**	−6.1915***	−20.1958***	−15.6615***	−22.2380***
2011/2012	8.2568***	−5.6621***	−39.8124***	−14.5493***	−19.4185***
2014/2015	10.5846***	7.7970***	−25.6127***	−12.9301***	0.7831
Origen (ref. English)					
Spanish	18.8578***	1.9898	14.4383	−0.0173	3.2269
German	−3.3594**	−3.7918***	6.1630*	−1.4965	4.4642***
North American	6.0838*	0.2276	14.4126*	7.2802**	7.0664**
Italian	14.3550***	0.2239	20.2386***	8.3841***	6.2672***
Other European	6.4350***	0.0846	10.2041**	1.7977	3.1475**
Rest of the world	15.4297***	0.5162	2.8479	10.1644***	9.9541***
Port of call (ref. Lanzarote)					
Santa Cruz de Tenerife	20.0659***	2.7229***	13.8920***	−4.9612***	−4.8920***
Santa Cruz de La Palma	0.6120	−1.0609	−1.4499	−24.4149***	0.1717
Las Palmas	13.0800***	2.2635***	−5.2807	−2.1455	−0.4215
Puerto del Rosario	−4.4440*	−2.4307**	−6.6131	−9.6637***	−3.5872**
La Gomera	−0.6625	1.6683	1.3804	−28.3735***	−25.3901***

(*continued on next page*)

Table A1 (*continued*)

Explanatory variable	Shopping	Food and beverages	Tours	Transport	Cultural activities
Constant	−28.3284***	−11.6355***	−11.7766***	−26.8689***	−42.4512***
N° obs.	12,461	12,461	12,461	12,461	12,461
Obs. Uncensored	7064	7199	1778	3783	1053

Notes: *, ** and *** indicate statistical significance at 10%, 5% and 1%, respectively.

References

Aguiló, E., & Juaneda, S. C. (2000). Tourist expenditure for mass tourism markets. *Annals of Tourism Research, 27*(3), 624–637.

Aguiló, E., Rosselló, J., & Vila, M. (2017). Length of stay and daily tourist expenditure: A joint analysis. *Tourism Management Perspectives, 21*, 10–17.

Ahmed, Z. U., Johnson, J. P., Ling, C. P., Fang, T. W., & Hui, A. K. (2002). County-of-origin and brand effects on consumers' evaluations of cruise lines. *International Marketing Review, 19*(3), 279–302.

Alegre, J., & Juaneda, C. (2006). Destination loyalty: Consumers' economic behavior. *Annals of Tourism Research, 33*(3), 684–706.

Al-Tarawneh, H. A. (2012). The main factors beyond decision making. *Journal of Management Research, 4*(1), 1–23.

Andriotis, K., & Agiomirgianakis, G. (2010). Cruise visitors' experience in a Mediterranean Port of call. *International Journal of Tourism Research, 12*(4), 390–404.

Arias, C., & Cox, T. L. (2001). Estimation of a US dairy sector model by maximum simulated likelihood. *Applied Economics, 33*(9), 1201–1211.

Assaf, A. G., & Tsionas, M. G. (2019). Revisiting shape and moderation effects in curvilinear models. *Tourism Management, 75*, 216–230.

Baker, D. A., & Crompton, J. L. (2000). Quality, satisfaction and behavioral intentions. *Annals of Tourism Research, 27*(3), 785–804.

Barslund, M. (2015). *MVTOBIT: Stata module to calculate multivariate tobit models by simulated maximum likelihood (SML)*.

Bilgic, A., Florkowski, W., Yoder, J., & Schreiner, D. (2008). Estimating fishing and hunting leisure spending shares in the United States. *Tourism Management, 29*(4), 771–782.

Brida, J. G., Bukstein, D., Garrido, N., & Tealde, E. (2012). Cruise passengers' expenditure in the Caribbean port of call of Cartagena de Indias: A cross-section data analysis. *Tourism Economics, 18*(2), 431–447.

Brida, J. G., Bukstein, D., & Tealde, E. (2015). Exploring cruise ship passenger spending patterns in two Uruguayan ports of call. *Current Issues in Tourism, 18*(7), 684–700.

Brida, J. G., Del Chiappa, G., Meleddu, M., & Pulina, M. (2014). A comparison of residents' perceptions in two cruise ports in the Mediterranean Sea. *International Journal of Tourism Research, 16*(2), 180–190.

Brida, J. G., Fasone, V., Scuderi, R., & Zapata-Aguirre, S. (2014). Exploring the determinants of cruise passengers' expenditure at ports of call in Uruguay. *Tourism Economics, 20*(5), 1133–1143.

Brida, J. G., Lanzilotta, B., Moreno, L., & Santiñaque, F. (2018). A non-linear approximation to the distribution of total expenditure distribution of cruise tourists in Uruguay. *Tourism Management, 69*, 62–68.

Brida, J. G., Pulina, M., Riaño, E., & Zapata-Aguirre, S. (2012). Cruise passengers' experience embarking in a Caribbean home port. The case study of Cartagena de Indias. *Ocean and Coastal Management, 55*, 135–145.

Brida, J. G., & Risso, W. A. (2010). Cruise passengers expenditure analysis and probability of repeat visit to Costa Rica: A cross-section data analysis. *Tourism Analysis, 15*(4), 425–434.

Brida, J. G., & Zapata, S. (2010). Cruise tourism: Economic, socio-cultural and environmental impacts. *International Journal of Leisure and Tourism Marketing, 1*(3), 205–226.

Cappellari, L., & Jenkins, S. (2006). Calculation of multivariate normal probabilities by simulation, with applications to maximum simulated likelihood estimation. *The Stata Journal, 6*(2), 156–189.

Chen, J. M., Petrickd, J. F., Papathanassise, A., & Li, X. (2019). A meta-analysis of the direct economic impacts of cruise tourism on port communities. *Tourism Management Perspectives, 31*, 209–218.

CLIA. (2021). *State of the cruise industry outlook 2021*. Cruise lines industry association. https://cruising.org/-/media/research-updates/research/2021-state-of-the-cruise-industry_optimized.ashx (Accessed 26/02/2021).

Cohen, S., Prayag, G., & Moital, M. (2014). Consumer behavior in tourism: Concepts, influences and opportunities. *Current Issues in Tourism, 17*(10), 872–909.

Cuéllar-Río, M., & Kido-Cruz, M. T. (2008). Perfil y análisis del gasto del crucerista: el caso de Bahías de Huatulco (México). *Cuadernos de Turismo, 22*, 47–78.

Dai, T., Hein, C., & Zhang, T. (2019). Understanding how Amsterdam City tourism marketing addresses cruise tourists' motivations regarding culture. *Tourism Management Perspectives, 29*, 157–165.

Dayour, F., Adongo, C. A., & Taale, F. (2016). Determinants of backpackers' expenditure. *Tourism Management Perspectives, 17*, 36–43.

Deaton, A., & Muellbauer, J. (1980). *Economics and consumer behavior*. Cambridge: Cambridge University Press.

Del Chiappa, G., & Abbate, T. (2016). Island cruise tourism development: A resident's perspective in the context of Italy. *Current Issues in Tourism, 19*(13), 1372–1385.

Del Chiappa, G., Lorenzo-Romero, C., & Gallarza, M. (2018). Host community perceptions of cruise tourism in a homeport: A cluster Analysis. *Journal of Destination Marketing & Management, 7*, 170–181.

Díaz-Pérez, F. M., Bethencourt-Cejas, M., & Álvarez-González, J. A. (2005). The segmentation of canary island tourism markets by expenditure: Implications for tourism policy. *Tourism Management, 26*(6), 961–964.

Disegna, M., & Osti, L. (2016). Tourists' expenditure behaviour: The influence of satisfaction and the dependence of spending categories. *Tourism Economics, 22*(1), 5–30.

Divisekera, S. (2009). Ex post demand for Australian tourism goods and services. *Tourism Economics, 15*(1), 153–180.

Divisekera, S. (2010). Economics of tourist's consumption behavior: Some evidence from Australia. *Tourism Management, 31*(5), 629–636.

Divisekera, S., & Deegan, J. (2010). An analysis of consumption behaviour of foreign tourists in Ireland. *Applied Economics, 42*(13), 1681–1697.

Domènech, A., Gutiérrez, A., & Anton Clavé, S. (2020). Cruise passengers' spatial behaviour and expenditure levels at destination. *Tourism Planning & Development, 17*(1), 17–36.

Duman, T., & Mattila, A. S. (2005). The role of affective factors on perceived cruise vacation value. *Tourism Management, 26*(3), 311–323.

Dwyer, L., & Forsyth, P. (1998). Economic significance of cruise tourism. *Annals of Tourism Research, 25*(2), 393–415.

Eugenio-Martin, J. L., & Campos-Soria, J. A. (2014). Economic crisis and tourism expenditure cutback decision. *Annals of Tourism Research, 44*, 53–73.

Gargano, R., & Grasso, F. (2016). Cruise passengers' expenditure in the Messina port: A mixture regression approach. *Journal of International Studies, 9*(2), 158–169.

Geweke, J. (1989). Bayesian inference in econometric models using Monte Carlo integration. *Econometrica, 57*(6), 1317–1339.

Greene, W. H. (2003). *Econometric analysis* (5th ed.). Upper Saddle River: Prentice-Hall.

Gui, L., & Russo, A. P. (2011). Cruise ports: A strategic nexus between regions and global lines – Evidence from the Mediterranean. *Maritime Policy & Management, 38*(2), 129–150.

Hajivassiliou, V., & McFadden, D. (1998). The method of simulated scores for the estimation of LDV models. *Econometrica, 66*(4), 863–896.

Hawkins, D. I., & Mothersbaugh, D. L. (2010). *Consumer behavior: Building marketing strategy* (11th ed.). Boston, MA: McGraw Hill.

Henthorne, T. L. (2000). An analysis of expenditures by cruise ship passengers in Jamaica. *Journal of Travel Research, 38*, 246–250.

Hung, K., Lee, J.-S., Wang, S., & Petrick, J. F. (2020). Constraints to cruising across cultures and time. *International Journal of Hospitality Management, 89*, 102576. https://doi.org/10.1016/j.ijhm.2020.102576.

Hung, K., & Petrick, J. F. (2011). Why do you cruise? Exploring the motivations for taking cruise holidays, and the construction of a cruising motivation scale. *Tourism Management, 32*(2), 386–393.

Jang, S. S., Bai, B., Hong, G. S., & O'Leary, J. T. (2004). Understanding travel expenditure patterns: A study of Japanese pleasure travelers to the United States by income level. *Tourism Management, 25*(3), 331–341.

Keane, M. P. (1994). A computationally practical simulation estimator for panel data. *Econometrica, 62*, 95–116.

Kim, W. G., Kim, T., Gazzoli, G., Park, Y., Kim, S. H., & Park, S. S. (2011). Factors affecting the travel expenditure of visitors to Macau, China. *Tourism Economics, 17*(4), 857–883.

Klein, R. (2002). *Cruise ship blues: The underside of the cruise ship industry*. Gabriola Island, BC: New Society Publishers.

Laesser, C., & Crouch, G. I. (2006). Segmenting markets by travel expenditure patterns: The case of international visitors to Australia. *Journal of Travel Research, 44*(4), 397–406.

Larsen, S., Wolff, K., Marnburg, E., & Øgaard, T. (2013). Belly full, purse closed Cruise line passengers' expenditures. *Tourism Management Perspectives, 6*, 142–148.

Lee, G., & Lee, M. K. (2017). Estimation of the shore excursion expenditure function during cruise tourism in Korea. *Maritime Policy & Management, 44*(4), 524–535.

Li, X., & Petrick, J. F. (2008). Examining the antecedents of brand loyalty from an investment model perspective. *Journal of Travel Research, 47*, 25–34.

Lopes, M. J., & Dredge, D. (2018). Cruise tourism shore excursions: Value for destinations? Cruise tourism shore excursions. *Journal of Tourism Planning and Development, 15*(6), 633–652.

Lynch, C. (2004). *Cruise tourism in Bar Harbor*. Maine: An Analysis of Likelihood of Passenger Return and Passenger Expenditures in Port. Unpublished doctoral dissertation. The University of Maine. United States.

MacNeill, T., & Wozniak, D. (2018). The economic, social, and environmental impacts of cruise tourism. *Tourism Management, 66*, 387–404.

Marksel, M., Tominc, P., & Bozicnik, S. (2017). Cruise passengers' expenditures: The case of port of Koper. *Tourism Economics, 23*(4), 890–897.

Marrocu, E., Paci, R., & Zara, A. (2015). Micro-economic determinants of tourist expenditure: A quantile regression approach. *Tourism Management, 50*, 13–30.
Moutinho, L. (1987). Consumer behaviour in tourism. *European Journal of Marketing, 21* (10), 5–44.
Nicolau, J. L., & Más, F. J. (2005). Heckit modelling of tourist expenditure: Evidence from Spain. *International Journal of Service Industry Management, 16*(3), 271–293.
Oppermann, M. (1996). Visitation of tourism attractions and tourist expenditure patterns: Repeat versus first-time visitors. *Asia Pacific Journal of Tourism Research, 1* (1), 61–68.
Parola, F., Satta, G., Penco, L., & Persico, L. (2014). Destination satisfaction and cruiser behavior: The moderating effect of excursion package. *Research in Transportation Business & Management, 13*, 53–64.
Pérez-Rodríguez, J. V., & Ledesma-Rodríguez, F. (2019). Unconditional quantile regression and tourism expenditure: The case of the Canary Islands. *Tourism Economics*. https://doi.org/10.1177/1354816619891552 (1354816619891552).
Petrick, J. F. (2004). The roles of quality, value and satisfaction in predicting cruise passengers' behavioural intentions. *Journal of Travel Research, 42*(4), 397–407.
Petrick, J. F. (2005). Segmenting cruise passengers with price sensitivity. *Tourism Management, 26*(5), 753–762.
Petrick, J. F. (2006). The utilization of critical incident technique to examine cruise passengers' repurchase intentions. *Journal of Travel Research, 44*(6), 273–280.
Pino, J. F. B., & Tovar, B. (2019). Explaining cruisers' shore expenditure through a latent class tobit model: Evidence from the Canary Island. *Tourism Economics, 25879*, 1105–1133. https://doi.org/10.1177/1354816618823599.
Risso, W. A. (2012). El gasto de los cruceristas en Uruguay 2008–2010. *Revista de Turismo y patrimonio cultural. PASOS, 3*, 393–406.
Rodrigue, J. P., & Notteboom, T. (2013). The geography of cruises: Itineraries, not destinations. *Applied Geography, 38*, 31–42.
Rodríguez-Alvarez, A., & Tovar, B. (2012). Have Spanish port sector reforms during the last two decades been successful? A cost frontier approach. *Transport Policy, 24*, 73–82.
Sharma, A., & Nicolau, J. L. (2020). An open market valuation of the effects of COVID-19 on the travel and tourism industry. *Annals of Tourism Research, 83*, Article 102990. https://doi.org/10.1016/j.annals.2020.102990.
Sirakaya, E., & Woodside, A. G. (2005). Building and testing theories of decision making by travellers. *Tourism Management, 26*(6), 815–832.
Stefanidaki, E., & Lekakou, M. (2012). Generated economic impact on cruise destinations: The Piraeus case. In A. Papathanassis (Ed.), *Cruise tourism and society* (pp. 173–192). Berlin, Heidelberg: Springer.
Syriopoulos, T., & Sinclair, M. (1993). An econometric study of tourism demand: The AIDS model of US and European tourism in Mediterranean countries. *Applied Economics, 25*(12), 1541–1552.
Tattara, G. (2014). *Quantifying Cruising. Study on the economic impact of large cruise ships at Venice*. Corte del Fontego Editore. Web site: http://www.jbna.org/IS%20-%20Quantifying%20Cruising.pdf (Accessed 14/02/2019).
Thrane, C., & Farstad, E. (2012). Nationality as a segmentation criterion in tourism research: The case of international tourists' expenditures while on trips in Norway. *Tourism Economics, 18*(1), 203–217.
Tichavska, M., & Tovar, B. (2015a). Port-city exhaust emission model: An application to Cruise and Ferry operations in Las Palmas Port. *Transportation Research Part A: Policy and Practice, 78*, 347–360.
Tichavska, M., & Tovar, B. (2015b). Environmental cost and eco-efficiency from vessel emissions in Las Palmas Port. *Transportation Research Part E, 83*, 126–140.
Tichavska, M., & Tovar, B. (2017). External costs of vessel emissions at port: A review of the methodological and empirical state of the art. *Transport Reviews, 37*(3), 383–402.
Tichavska, M., Tovar, B., Gritsenko, D., Johansson, L., & Jalkanen, J.-P. (2019). Air emissions from ships in port: Does regulation make a difference? *Transport Policy, 75*, 128–140.
Tovar, B., Espino, R., & Lopez-del-Pino, F. (2021). Residents' perceptions and attitudes towards the cruise tourism impact in Gran Canaria. *Transportation Business and Management*. https://doi.org/10.1016/j.rtbm.2020.100586.
Tovar, B., & Tichavska, M. (2019). Environmental cost and eco-efficiency from vessel emissions under diverse SOx regulatory frameworks: A special focus on passenger port hubs. *Transportation Research Part D, 83*, 126–140.
Tovar, B., & Wall, A. (2014). The impact of demand uncertainty on port infrastructure costs: Useful information for regulators? *Transport Policy, 33*, 176–183.
Tovar, B., & Wall, A. (2021a). Regulation and finance in the Spanish port sector. In H. Haralambides, A. Tei, & C. Ferrari (Eds.), *Regulation and finance in the port industry: Lessons from worldwide experiences*. Palgrave (Forthcoming).
Tovar, B., & Wall, A. (2021b). *Economic and Environmental Regulation in the port sector. Planned for publication in the Encyclopedia of Transport* (Edited by Roger Vickerman). Elsevier. Forthcoming.
Train, K. E. (2009). *Discrete choice methods with simulation*. Cambridge University Press.
Vayá, E., Garcia, J. R., Murillo, J., Romaní, J., & Suriñach, J. (2018). Economic impact of cruise activity: The case of Barcelona. *Journal of Travel & Tourism Marketing, 35*(4), 479–492.
Veall, M. R., & Zimmermann, K. F. (1996). Pseudo-R^2 measures for some common limited dependent variable models. *Journal of Economic Surveys, 10*(3), 241–259.
Wang, Y., Rompf, P., Severt, D., & Peerapatdit, N. (2006). Examining and identifying the determinants of travel expenditure patterns. *International Journal of Tourism Research, 8*(5), 333–346.
Whyte, L. J. (2018). Eliciting cruise destination attributes using repertory grid analysis. *Journal of Destination Marketing & Management, 10*, 172–180.

José F. Baños is associate professor of Economics at the University of Oviedo (Spain). His main areas of research are the analysis of efficiency and productivity and tourism economics. He is currently Director of the Tourist Information System of Asturias. He has published several articles in scientific journals, including Applied Economic, Energy Policy, Energy Journal, European Journal of Operational Research, Journal of Productivity Analysis, Journal of Travel Research, Tourism Economics, Transportation or Transportation Research Part A: Policy and Practice.

Beatriz Tovar (www.personales.ulpgc.es/btovar.daea) is Full Professor at Las Palmas University, and member of the University Institute for Tourism and Sustainable Economic Development, a leading research team at international level in the field of innovative and sustainable tourist development. She has published in several respected international journals including Applied Economics, Energy Economics, Journal of Production Economics, Maritime Economics & Logistics, Tourism Economics, Transport Policy, Transport Review, Transportation, Transportation Research Part A, Part D, and Part E, among others. She does also act as a reviewer for several international journals and she is a member of the Editorial advisory board (EAB) for the journal Transportation Research Part E, International Journal of Transportation Engineering and Technology and also for the journal Sustainability (Sustainable Transportation Section).