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Expanding our understanding of cruise visitors' expenditure at destinations: The role of spatial patterns, onshore visit choice, and cruise category

Abstract

Cruise tourism is an important and growing source of visitors to destinations. To expand our knowledge of this phenomenon, this study incorporates three new drivers into the analysis of the expenditure patterns of cruise passengers at destinations, namely, spatial intra-destination behavior (single node, multiple node, or hinterland), onshore visit choice (independent or guided), and cruise category (standard, premium, luxury, or exclusive). The study uses quantile regression to unearth the intricacies of the proposed relationships and a dataset that combines GPS tracking technologies and traditional surveys. Results suggest that the mobility pattern, onshore visit choice, and time spent at a destination of cruise visitors have significant effects on their expenditures. However, these effects vary along with the level of expenditure, whereas cruise category does not exert a clear effect on expenditure. The implications for destination management organizations are also discussed.

Keywords: cruise tourism; spending patterns; tourist mobility; consumer behavior; quantile regression; visitor tracking.

1. Introduction

Cruise tourism continues to grow worldwide with the number of passengers posting an annual growth rate of 6.63% from 1990 to 2020 (CruiseMarketWatch 2019). The Mediterranean region is the second largest destination for cruise tourism (17.3%) after the Caribbean (34.4%) (CLIA 2019). However, the growth of cruise tourism has not been without controversy, and some of the most popular destinations (e.g., Barcelona, Venice, and Dubrovnik) are becoming overwhelmed by the large number of cruise visitors (Higgins-Desbiolles 2019). The negative impacts of the cruise ship model on destinations are evident, such as the overcrowding of public spaces, especially in already crowded popular destinations, the inconveniences brought upon local residents (Brandajs and Russo 2019), and the effects on the environment (Stefanidaki and Lekakou 2014). These dynamics feed the debate on the true value of cruise tourism for destinations (Lopes and Dredge 2018).

In this context, studying the expenditure behavior of cruise passengers at destinations is imperative (Brida and Risso 2010). Previous studies have attempted to identify the determinants of passenger expenditures with a special focus on sociodemographic characteristics, travel context factors, and psychological variables (e.g., Brida et al. 2014; Brida et al. 2018; Di Vaio, Lepore, and Varriale 2018; Gargano and Grasso 2016). In terms of methodology, previous studies have employed a variety of models, mostly ordinary least squares (OLS), but also latent class, Tobit, or Logit models, among others (for a recent review, see Baños Pino and Tovar 2019).

The present work attempts to increase our understanding of the expenditure patterns of cruise visitors in two areas. First, it proposes new drivers of cruise visitors' expenditures that have not been considered in previous research, namely, spatial behavior (mobility patterns associated with the visit), onshore visit choice (independent or guided passenger), and cruise category (standard, premium, luxury, or exclusive vessel). Second, this study

51 applies quantile regression (QR) to estimate the linear relationship between the independent
52 variables examined and the different quantiles of cruise passengers' expenditures. This
53 method allows for the potential differentiated effects of the proposed variables to be
54 identified over the distribution of the dependent variable (expenditures). Such distinction is
55 particularly relevant for analyzing expenditures, because it allows the observation of
56 determinant factors and the detection of variations in the effects of these factors across
57 different points (quantiles) of the range of the dependent variable. Thus, fundamental
58 segmentation implications are derived.
59

60 **2. Literature review**

61 Cruise-related literature was scarce until 2000 but has developed considerably since then
62 (Papathanassis and Beckmann 2011). The studies have considered different perspectives,
63 including cruise lines, passenger behavior, crew behavior, local businesses, residents and/or
64 destination, and environmental impacts. The present study aligns with the stream of research
65 that examines the behavior of cruise visitors in a port of call (ports used by cruise lines during
66 a cruise trip).

67 Previous studies conducted from the perspective of cruise passengers have focused on
68 the expectations, motivations, satisfaction, and/or intention of these passengers to return to or
69 recommend a destination (e.g., Andriotis and Agiomirgianakis 2010; Gabe, Lynch, and
70 McConnon 2006; Hosany and Witham 2009; Larsen and Wolff 2016; Scherrer, Smith, and
71 Dowling 2011; Toudert and Bringas-Rábago 2016), their expenditure at a destination (e.g.,
72 Baños Pino and Tovar 2019; Brida et al. 2018; Douglas and Douglas 2004; Henthorne 2000;
73 Larsen, Wolff, Marnburg, and Øgaard 2013; Marksel, Tominc, and Bozicnik 2017), and to a
74 lesser extent, their spatiotemporal behavior at a destination (e.g., Andriotis and

75 Agiomirgianakis 2010; De Cantis et al. 2016; Ferrante, De Cantis, and Shoval 2018; Jaakson
76 2004; Scherrer, Smith, and Dowling 2011).
77 Expenditure per capita onshore is the most common measure of the expenditure of
78 cruise passengers at destinations (Brida et al. 2014; Brida et al. 2018; Domènech, Gutiérrez,
79 and Anton-Clavé 2020; Gargano and Grasso 2016; Henthorne 2000; Marksel, Tominc, and
80 Bozicnik 2017; Parola et al. 2014). However, other measures have also been used, including
81 expenditure per capita onboard and onshore (Brida and Risso 2010), expenditure per capita
82 excluding the cost of the excursion (Cuellar-Río and Kido-Cruz 2008), expenditure per
83 category (e.g., food and beverage and shopping) (Brida et al. 2012; Brida, Bukstein, and
84 Tealde 2015), and the decision whether or not to purchase (Brida, Bukstein, and Tealde
85 2015).
86 Baños Pino and Tovar (2019) highlighted the determinants of cruise passengers'
87 expenditure at a destination that have been examined in previous works, including age,
88 gender, education level, income, occupation, marital status, nationality, satisfaction, port of
89 call, and hours onshore. Some of these variables have also been used in other related studies
90 that examine the expenditures of cruisers (De Cantis et al. 2016; Domènech, Gutiérrez, and
91 Anton-Clavé 2020; Ferrante, De Cantis, and Shoval 2018). However, beyond the
92 sociodemographic and psychographic characteristics of passengers and travel-related factors,
93 this study argues that other important variables can be used to improve the understanding of
94 the expenditure phenomenon of cruise visitors.
95
96 **2.1 Spatial behavior of cruise visitors at destinations**
97 Spatial behavior within a destination constitutes an essential line of research in tourism
98 geography and contributes to the improved planning and management of destinations
99 (Dredge 1999). The first studies that analyzed such spatial behavior focused on intra-

destination mobility and spatiotemporal flows, illustrating the visitor concentration in a destination and the temporal consumption (Hall 2005; Lew and McKercher 2006; McKercher and Lew 2004). Theoretically, intra-destination patterns have been approached from two basic perspectives. One is based on movements from the location of the tourist accommodation in the form of concentric rings (Lew and McKercher 2006), and the other is a more elaborate perspective structured around linear movements that interrelate nodes and configure lattice structures. Lattice structures are distinguished by three types of patterns, including point-to-point, circular, and complex patterns (Lew and McKercher 2006; McKercher and Lau 2008; van der Knaap 1999). Thus, individual movements and their aggregation are analyzed to understand the underlying spatial patterns within the destination region.

However, these models did not consider the physical structure of a destination, which is a key aspect in the behavioral issues related to urban tourism (Hall and Page 2006). Pioneering works like that of Jansen-Verbeke (1986) integrated physical characteristics as a main component of the primary elements that configurate the urban tourism product. Other approaches identified functional areas in the "tourist city" (Burtenshaw, Bateman, and Ashworth 1991) as a zoning exercise that progressively involves the examination of tourists' activity space, describing the routeways and nodes that comprise the central tourist district of the city (Shaw and Williams 1994).

Following this research line and inspired by the work of Gunn (1994), Dredge (1999) identified four main elements within a destination region, namely, nodes, districts, circulation routes, and gateways. Specifically, Dredge (1999, p. 782) used the term "nodes" to denote attraction complexes (i.e., any facility that tourists visit or think about visiting) and service components (i.e., range of facilities to support visitors). Thus, when visitors stay in a destination, the outcomes of their spatial behavior occur between nodes and within them.

125 Dredge (1999) also added that the configuration of nodes is established depending on the
126 level of attraction, thereby allowing the nodes within the same destination to be categorized
127 from primary to tertiary nodes or from high to low attraction.

128 In some way, the nodes actually operate as urban tourism precincts (Hayllar and
129 Griffin 2005). These authors defined urban tourism precincts as "distinctive geographic areas
130 within a larger urban area, characterized by a concentration of tourist-related land uses,
131 activities and visitation that possess a distinctive character." This distinction is a result of the
132 evolution of the existing urban fabric or as a new urban development. This notion allows the
133 analysis of tourist activity within each precinct and the movements between the precincts
134 located in a destination (Hayllar, Griffin, and Edwards 2008).

135 Although these intra-destination flows can be of great importance for tourism
136 activities and destination planning and management, they have not been analyzed
137 extensively. McKercher and Zoltan (2014) attributed the scarcity of research on intra-
138 destination movements to three main reasons: the need for increased accuracy in the data, the
139 reliability of the information provided by tourists, and the lack of an adequate theoretical
140 framework. Indeed, collecting spatiotemporal data through traditional methods (i.e., surveys
141 or travel diaries) is a complex task (Shoval and Isaacson 2010). However, the evolution of
142 information and communication technologies, particularly those aimed at georeferencing
143 visitor movements, has introduced new possibilities for studying intra-destination mobility
144 and, specifically, identifying cruise flows at destinations (De Cantis et al. 2016; Domènech,
145 Gutiérrez, and Anton-Clavé 2020; Ferrante, De Cantis, and Shoval 2018).

146 With regard to the spatial boundaries of cruise activity in a destination, Esteve-Pérez
147 and García-Sánchez (2015) delimited three geographical areas, namely, port area, port city,
148 and tourist hinterland. Port area is the restricted zone for port employees and cruise
149 passengers, port city is the administrative municipality area where the port is located, and

tourist hinterland is the geographic area that can be visited by cruise passengers and can be extended beyond the port city. Hence, the tourist hinterlands of every port are different and dynamic depending on the movements of cruise passengers, movements that are conditioned by the type of port, the distribution of tourist attractions, and the land transport network, among others (De Cantis et al. 2016; Esteve-Pérez and García-Sánchez 2015; Gui and Russo 2011; Rodrigue and Notteboom 2013).

Except for the pioneering work of Jaakson (2004), the mobility of cruise visitors in a given destination is a relatively recent research topic (De Cantis et al. 2016; Domènech, Gutiérrez, and Anton-Clavé 2020; Ferrante, De Cantis and Shoval 2018; Paananen and Minoia 2019). Jaakson (2004) was one of the first scholars to identify different segments with differentiated spatial behavior by analyzing the extent to which cruise passengers move within a "tourist bubble" in a destination on the Mexican Pacific coast (Zihuatanejo). However, it was not until more than 10 years later that researchers turned their attention to this phenomenon again. De Cantis et al. (2016) and Ferrante, De Cantis, and Shoval (2018) recently used GPS technologies to analyze the spatial behavior of independent cruise passengers in Palermo and Dubrovnik. In terms of length of visit, average distance from ports, movement speed, and attractions visited, they concluded that visits to Caribbean ports are shorter and take place closer to ships compared with visits to Mediterranean ports. De Cantis et al. (2016) were the first to categorize cruise passengers on the basis of their mobility patterns. Paananen and Minoia (2019) examined the mobility of independent cruise passengers in Helsinki to address accessibility issues and determine their overall satisfaction with their visit by combining new technologies and qualitative methods.

Recently, Domènech, Gutiérrez, and Anton-Clavé (2020) checked for spatiotemporal behavior differences among cruise visitors in Tarragona (Spain) according to their expenditure levels. This research revealed that expenditures decrease when visitors visit a

high number of attractions and increase when they spend a longer time visiting primary attractions in depth. Additionally, results indicated that the mobility patterns of cruise visitors differ according to their expenditure level. Specifically, those passengers with low per capita expenditures show more homogeneous patterns (in terms of the average time spent in a certain zone and the number of passengers visiting that zone) than those with high per capita expenditures.

To advance our knowledge on intra-destination mobility and by following the existing theoretical models of tourism mobility, this study adopts the notion of tourist nodes to examine the spatial behavior of visitors at a destination (i.e., cruise passengers). Thus, it examines the way cruise visitors' spatial patterns affect their expenditures according to the nodes visited (single node vs. multiple nodes vs. beyond port city hinterland). Previous studies that examined the spending patterns of visitors suggest that higher expenditure levels are expected when visitors are concentrated in particular nodes (Brown 1969; Shoval et al. 2015). Thus, the following is hypothesized:

H1. Cruise visitors who stay in a single node show higher levels of expenditure than cruisers who visit multiple nodes.

2.2 Onshore visit choice (independent vs. guided visitors)

Based on the way they decide to visit a destination, cruise passengers can be classified into independent, those who choose to go on their own and visit the city independently, and guided visitors, those who take one of the tours offered by the cruise company, such as shore excursions.

Previous studies focused on the motivations behind such visit choice, including unfamiliarity with a destination (e.g., Douglas and Douglas 2004), or on the design of shore excursions (e.g., Buzova, Sanz-Blas, and Cervera-Taulet 2018; Lopes and Dredge 2018).

Shore excursions have been proven to be an important source of cruise passengers' experiences onshore (Lyu et al. 2017). For example, Parola et al. (2014) found that an excursion package moderates the relationship between destination satisfaction and intention to return.

Few papers have examined the contrasting behaviors of independent and guided cruise passengers. Andriotis and Agiomirgianakis (2010) used a sample comprising both types of passengers but did not examine their differences. Meanwhile, Sanz-Blas, Buzova, and Carvajal-Trujillo (2019) considered the role of onshore visit choice as a moderator of the relationship between satisfaction and behavioral intentions of tourists at a cruise destination.

From the cruise destination perspective, however, it would be interesting to consider the direct expenditures at destination of both types of visitors. Many studies that examined the expenditures of cruise passengers (e.g., De Cantis et al. 2016; Ferrante, De Cantis, and Shoval 2018) only considered independent cruise passengers as their target population, whereas very few studies examined guided visitors and their spending (e.g., Lee and Lee 2017; Lopes and Dredge 2018; Stefanidaki and Lekakou 2012). Sorrentino et al. (2019) performed a cluster analysis and obtained two groups of passengers (i.e., independent and organized) that showed differences in their scores of aesthetic perception toward a destination and port-related factors, including length of stay, onshore shopping experience, transport and tourist services, and security perception. These authors concluded that organized cruisers (passengers that choose an excursion package) tend to spend more than independent ones, although they did not analyze actual onshore visit. However, given that shore excursions are mainly sold by the cruise line and are not included in the cruise package (Lopes and Dredge 2018), it is reasonable to assume that this "extra" cost would prevent guided visitors from further spending and, therefore, their direct expenditures at destinations (excluding tour

prices and transport services paid to the ship company) would be lower than those of independent ones.

To advance on this stream of research, this study will consider the role of the type of visit (independent or guided) as a driver of cruise passengers' expenditure. Thus, the following is hypothesized:

H2. Independent cruise visitors show greater levels of expenditure at destinations than do guided cruise visitors.

2.3 Cruise category

Cruise category classifies ships according to the services they offer onboard. This variable is usually measured using rating systems, which aid in the purchase decision making of customers. Potential customers can then assess the existing differences among cruise lines before making a decision. These classifications are similar to the star categories used for hotels, which provide potential customers with a quality signal (Mohsin, Rodrigues, and Brochado 2019).

Cusano et al. (2017) argued that high cruise market differentiation exists in the Mediterranean region. These cruises can be categorized into contemporary, premium, and luxury cruises (Buzova, Sanz-Blas, and Cervera-Taulet 2018; Georgsdottir and Oskarsson 2017; Li and Kwortnik 2017; Vogel 2016). Meanwhile, the Berlitz guide ship rating classifies cruise ships into standard, premium, luxury, and exclusive cruise ships (Ward 2015). This system is currently the most commonly adopted classification in the cruise literature (e.g., Espinet-Rius et al. 2018). The Berlitz guide covers six main onboard aspects, including the ship itself, accommodation, cuisine, services, entertainment, and cruise experience, all of which are weighted and transformed into stars (from the lowest level of 1 to the maximum level of 6+). However, similar to other popular cruise guides, the Berlitz guide has been

criticized for its inconsistency, lack of clarity, and failure to account for many other factors that can affect star ratings (Swain 2006; Swain and Barth 2002).

Research that examines the differences between cruise market segments is scarce. Existing works in the cruise industry have analyzed the effect of cruise category on the perception toward shore excursions (Buzova, Sanz-Blas, and Cervera-Taulet 2018), but no evidence is available regarding its effect on the expenditure of cruise passengers. Georgsdottir and Oskarsson (2017) emphasized the idea that cruise passengers can be segmented according to the cruise ship/company because each cruise company targets different markets following multiple criteria (e.g., income). Thus, the differences in passenger expenditures may depend on cruise category as long as the more expensive cruises (luxury and exclusive) are afforded by wealthy passengers compared to the price paid by general cruise travelers (Wood 2004). Alternatively, luxury and exclusive cruises are characterized by high-quality onboard services and personalized experiences, where guide excursions are usually included in the total price paid (Ward 2015), thereby reducing off-board expenses. Therefore, the potential effects of cruise category on visitors' expenditures should be examined in depth. Accordingly, it is hypothesized that:

H3. The spending patterns of cruise visitors are influenced by cruise category.

2.4 Control variables

This study examines the other determinants of cruisers' expenditures that can be grouped into three categories: sociodemographic attributes (i.e., age, gender, income, and country of residence), psychological/psychographic factors (i.e., satisfaction with destination), and travel-related factors (i.e., previous cruising experience, previous experience in the destination, and length of visit). The effects of these variables have not been consistently established in previous research, with some studies showing their effect on expenditure while

274 others finding no relationships (e.g., Brida et al. 2014; Di Vaio, Lepore, and Varriale 2018;
275 Gargano and Grasso 2016; Lee and Lee 2017; Marksel, Tominc, and Bozicnik 2017). Figure
276 1 summarizes the main variables analyzed in this study.
277 Insert Figure 1 here
278

279 **3. Methodology**

280 **3.1 Study context**

281 The study context chosen for the analysis of the proposed model was the city of Valencia, the
282 third largest municipality in Spain in terms of population (791,413 inhabitants in 2018).
283 Valencia has undergone considerable transformation as a tourist destination over the last 15
284 years and demonstrated one of the highest growth rates in Europe (Pardo-García et al. 2016).
285 Such evolution is a result, among other factors, of several public policies that were
286 implemented to build new tourist facilities (i.e., iconic buildings), such as the Valencia
287 Conference Centre by Norman Foster or the City of Arts and Sciences by Santiago Calatrava,
288 as well as the hosting of international sporting events, including the 2007 America's Cup or
289 the European Grand Prix, a Formula One event that took place from 2008 until 2012 (Boira
290 Maiques 2016; Salom-Carrasco and Pitarch-Garrido 2017).
291 Consequently, Valencia has been positioned as an important urban tourist destination
292 (Puche-Ruiz and Obiol-Menero 2011; Salom-Carrasco and Pitarch-Garrido 2017), which
293 reflects its growing popularity as a cruise destination. Cervera and García (2016) proposed
294 other factors to explain the growth of cruise tourism in Valencia, such as improved internal
295 and external communications, infrastructure and port services, attention to cruise traffic, and
296 liberalization of shop opening times. Therefore, in 2018, the city received 421,518 cruise
297 passengers, making it the fourth largest Spanish Mediterranean port in terms of the number of
298 passengers received (Puertos del Estado 2019).

299 Recent research shows, however, that the local Valencian community is beginning to
300 perceive the risks (welfare, social, economic and heritage impacts) associated with cruise
301 activities and is having concerns regarding its future development (Del Chiappa, Lorenzo-
302 Romero and Gallarza 2018).
303
304 **3.2 Research design**
305 This study employs a multi-method approach (Creswell 2014; Seawright 2016; Tashakkori
306 and Teddlie 2003), including an interview-based survey, structured questionnaires, and GPS
307 tracking technologies. Although the use of GPS devices might have some limitations because
308 informed participants might change their behaviors when they are aware of being tracked, it
309 is justified by the reliability of the spatiotemporal data these devices offer compared to other
310 participant-observer or non-observational methods (Shoval and Isaacson 2007). This
311 procedure to track complete behavior paths is also quite common in the tourism context (e.g.,
312 Edwards and Griffin 2013; Zheng et al. 2017) and, specifically, in the cruise field (e.g., De
313 Cantis et al. 2016; Ferrante, De Cantis, and Shoval 2018). The present study follows the
314 research approach suggested by Ferrante, de Cantis, and Shoval (2018) for cruise tourism that
315 relies on the use of GPS technology to analyze cruise passengers' behavior at destinations in
316 conjunction with a traditional questionnaire-based survey. Questionnaires are widely used to
317 collect sociodemographic data and information about the visitors' knowledge of a destination,
318 motivations, and loyalty (e.g., De Cantis et al. 2016). Therefore, as stated in Li et al. (2019),
319 employing a fusion of methods can generate a combined dataset that accurately reflects the
320 intra-destination behavior of visitors.
321 A pilot study was conducted a month before the final study to test both questionnaires
322 and the logistics (i.e., embarking and disembarking procedures, terminal physical elements,
323 and GPS devices). Information regarding cruise arrivals, cruise capacity, and cruise company

was provided by the Port Authority of Valencia, and the study days were planned in order for all cruise categories to be present in the data collection. Given that the Berlitz rating only considers onboard services whereas this study focuses on onshore ones, cruise tourism stakeholders from Valencia were contacted to assess the Berlitz classification. Accordingly, the cruise category segmentation in Valencia was finally represented by 1.7% exclusive, 14% luxury, 61.3% premium, and 23% standard. Each cruise ship arriving at Valencia was classified into a specific category according to this proposal. Furthermore, cruise tourism stakeholders pointed out the distribution of passengers in terms of their onshore visit choice, approximately 80% are independent visitors and 20% are guided visitors. Hence, data collection was planned so that the two types of cruisers and the four cruise categories of cruise ships were adequately represented given the information available for cruise tourism in Valencia.

After the pilot study, data were collected in the port of Valencia between April and June 2018. The interviewers approached independent passengers twice, that is, right after the passengers disembarked their vessel and before they returned to their vessel after their visit to Valencia. The passengers who agreed to participate were asked to answer an initial questionnaire and were given the GPS data-logging equipment, a small device that they could easily carry around. This device recorded the position of the subject every 15 seconds by measuring in real time the coordinates of latitude, longitude, altitude, speed, time, and distance with an accuracy of few meters. Each device had a 20-hour battery which ensured its operation throughout the call. In the second stage, after the participants went back to their ships, they returned the GPS data-logger device and answered a final (short) questionnaire. All respondents were then given a present in exchange for their participation. The use of incentives (pecuniary or otherwise) to increase participation is not unusual in cruise tourism

348 research (e.g., Kang 2020). This procedure also helped prevent some participants from
349 forgetting to return the device.

350 The first questionnaire asked the respondents for information about their
351 sociodemographic characteristics, cruise trips, and prior familiarity with the destination, such
352 as whether it was their first time to go on a cruise and their first time to visit Valencia.
353 Meanwhile, the final questionnaire asked about the group composition, expenditure behavior,
354 and satisfaction with their visit (measured on a seven-point Likert scale). Expenditure
355 behavior was measured by collecting the amount passengers spent on different types of
356 products/services, namely, transport, attraction tickets, local souvenirs, general purchases,
357 food and beverages, tour price, and other expenditures, all of which reveal the level of
358 expenditure per capita. Regarding tour prices, no information about the exact distribution of
359 this expense among the different service providers was available. Thus, it was impossible to
360 distinguish the share of expenditure that remained in the destination and the share that went
361 to the cruise company. Given that the focus of this study is to examine direct expenditures at
362 destination, tour prices and transport services paid to the ship company were excluded for
363 further analysis.

364 By contrast, the guided visitors were approached at the end of their visit after
365 returning to their vessel. The questionnaire asked these respondents to give information about
366 their tour, and the other questions were identical to those asked to independent visitors. In
367 this case, the GPS data-logging equipment was held by the tour guides for us to know the
368 guided itineraries. This decision was made in consideration of the dispatch of guided tour
369 logistics. When guided visitors disembark to start a tour, they have to follow the instructions
370 of the local shore tour operators, and there is no possibility of interacting with them before
371 the tour. Consequently, the GPS devices were handed to the tour guides. Besides, because
372 guided visitors take the visit together with the tour guide and in groups, the assumption was

373 that the spatiotemporal patterns followed were almost the same. In fact, onshore visits are
374 strictly programmed and confined to specific geographical spaces (e.g., Navarro-Ruiz et al.
375 2019; Weaver 2005). Thus, although some passengers may walk around the visited site, the
376 space covered would not deviate too much from the one by the tour guide (the person
377 wearing the GPS) as the time spent in the site is necessarily the same.
378 The behavioral patterns of both types of cruise visitors were then differentiated
379 according to the number of nodes visited. The identification of nodes in Valencia was derived
380 from the specific spatial configuration and tourist attractions of the city. Based on the
381 classification presented in the Strategic Plan of Valencia (VisitValencia 2017), four main
382 nodes were considered: Bioparc, City Center, City of Arts and Sciences, and Marina Real and
383 Sea Promenade (Figure 2). The GPS data were analyzed using cartographic methods. GPS
384 tracking devices offered reliable data about the spatial location of individuals, but also
385 temporal information used to assess the length of visit. The city was divided into a grid, and
386 in each grid's cell the number of visitors and their average temporal consumption were
387 measured. This procedure is similar to those used in previous studies (e.g., De Cantis et al.
388 2016; Domènech, Gutiérrez, and Anton-Clavé 2020; Shoval et al. 2011). The main difference
389 is that the present study employs a configuration of the city based on existing tourist nodes
390 that articulate the spatiotemporal patterns of cruise passengers, as a further development of
391 the theoretical intra-destination spatial behavior models (Lew and McKercher 2006;
392 McKercher and Lau 2008; Van der Knapp 1999). Information about the spatial and temporal
393 behavior of each cruise passenger during the visit allowed us to assign each passenger a
394 specific pattern: visitors staying in the cells of a single node, visitors present in cells of
395 multiple nodes within the city, or visitors discovering the hinterland beyond the city nodes.
396 Figure 2 presents the location of Valencia and the four nodes examined in this study.
397 A single node indicates that the cruisers visited one of the four nodes, spending the entire

time in them, whereas multiple nodes indicate that these cruisers visited two or more nodes, distributing their available time among them.

Insert Figure 2 here

The study involved 627 cruise visitors, and the final valid sample was 487. The reduction is attributed to the data cleaning applied to the methods used. Specifically, those individuals who answered both the initial and final questionnaires and reported expenditures different from zero were counted as valid. Thus, the final sample does not have any missing values in the dependent variable "expenditures." Meanwhile, those participants using GPS trackers that showed temporary jumps in their position given the effect of the urban canyon were eliminated (Ferrante, De Cantis, and Shoval 2018).

3.3 Method

The QR technique proposed by Koenker and Bassett (1978) was used to analyze the expenditures of cruise passengers. This technique was previously employed to examine tourist expenditures (e.g., Park, Woo, and Nicolau, 2020). The empirical model is formulated as follows:

$$E_i = \alpha + \beta_1 \cdot PType_i + \sum_{p=1}^{P} \gamma_{2p} \cdot Pattern_{ip} + \sum_{c=1}^{C} \delta_{3c} \cdot Ctype_{ic} + \sum_{h=1}^{H} \theta_{4h} \cdot CV_{ih} + \varepsilon_i,$$

where E_i represents the expenditures of individual i, $PType_i$ denotes onshore visit choice, $Pattern_{ip}$ represents the mobility pattern p, $CType_{ic}$ denotes cruise category c, CV_{ih} denotes the control variable h, α is the constant term, β_1 is the coefficient that captures the effect of onshore visit choice, γ_{2p} is associated with the effect of each mobility pattern, δ_{3c} reflects the effect of the cruise category, θ_{4h} is the coefficient associated with the *h-th* control variable, and ε_{it} is the normal error.

Ordinary least squares (OLS) regression uses the conditional mean of the dependent variable, while QR utilizes the conditional τth quantile of the dependent variable where $\tau \in$

(0, 1), thereby measuring the effects of the explanatory variables over the complete distribution of the dependent variable (instead of merely focusing on the mean value as in the OLS case). Accordingly, more intricate effects can be unearthed because potentially different effects (parameters) are estimated for each quantile. From an operational viewpoint, while the sum of squared residuals is minimized in the OLS regression, QR focuses on minimizing the sum of absolute residuals as follows:

$$min \sum_i \tau \left| E_i - \left(\beta_1(\tau) \cdot PType_i + \sum_{p=1}^{P} \gamma_{2p}(\tau) \cdot Pattern_{ip} + \sum_{c=1}^{C} \delta_{3c}(\tau) \cdot Ctype_{ic} + \sum_{h=1}^{H} \theta_{4h}(\tau) \cdot CV_{ih} \right) \right|$$

$$+ \sum_i (1-\tau) \left| E_i - \left(\beta_1(\tau) \cdot PType_i + \sum_{p=1}^{P} \gamma_{2p}(\tau) \cdot Pattern_{ip} + \sum_{c=1}^{C} \delta_{3c}(\tau) \cdot Ctype_{ic} + \sum_{h=1}^{H} \theta_{4h}(\tau) \cdot CV_{ih} \right) \right|.$$

Note that all the parameters related to the distinct quantiles are not estimated simultaneously; rather, they are obtained separately as if they are individual regression models, and so parsimony is warranted. With 27 parameters and 487 observations, the estimates do not have a high risk of overfitting because the ratio observation per parameter is within the recommended range of 10 to 20 (Harrel 2015). The fact that quantiles other than 50% are significant likewise means that the results provided by the QR models are richer than the ones obtained via OLS. The latter assumes that the effect is constant over the whole range of the dependent variable, while the QR for each quantile, if significant and different from the median, allows us to unearth the distinctive impact depending on the range of the dependent variable.

4. Results

The descriptive statistics of the examined variables are shown in Table 1. Most of the respondents are female (63.4%) aged below 65 years (71.7%) who declared more than 3,000 € monthly household income (51.9%). The most represented country of residence is the

United Kingdom (24.4%) followed by Italy (18.1%), while the most represented cruise category is the premium one (55.6%). A large share of the respondents declared themselves as repeat cruisers (76.2%) visiting Valencia for the first time (76.8%) and visiting the destination on their own (79.3%). The most common group composition is two people (traveling with a partner; 69.2%). The respondents showed a high level of destination satisfaction and spent almost five hours onshore. They spent almost 36 € per capita on average at the destination, which was similar to those reported in previous studies and in similar contexts (e.g., Domènech, Gutiérrez, and Anton-Clavé 2020). Specifically, respondents reported an average of 1.92 € (SD = 3.46) expenditure on transport, 3.39 € (SD = 7.83) on attraction tickets, 11.56 € (SD = 20.80) on souvenirs, 8.20 € (SD = 29.99) on general purchases, 5.93 € (SD = 6.88) on food and beverage, and 2.74 € (SD = 9.33) on other purchases.

Insert Table 1 here

The results of the estimated model are presented in Table 2. Before estimating the model, we analyzed the potential existence of collinearity. According to the variance inflation factors, all parameters are below the recommended value of 10 (Neter, Wasserman, and Kutner 1989). Therefore, collinearity does not present an issue in this study. We also tested for heteroskedasticity, and the Breusch–Pagan test did not reject homoskedasticity ($F = 0.481$; $p = 0.986$). In addition, sample selection bias can be an issue in this empirical application because only those individuals with positive non-zero expenditures are considered. Given that we applied the sample selection correction proposed by Heckman (1979), we introduced inverse Mill's ratio as an additional variable in the main equation. The results show that the parameter associated with the inverse Mill's ratio is nonsignificant ($t = 1.017$; p-value = 0.309). This nonsignificant parameter means that sample selection bias should not be an issue in this empirical application. Thus, as our data are consistent with no

selection bias, the standard regression model—or the QR for that matter—can be used so that we can focus only on those individuals with positive non-zero expenditures[1].

Insert Table 2 here

Mobility patterns. The intra-destination mobility is illustrated in Figure 3 (data provided by the GPS receivers), which shows the nodes with high levels of concentrated cruise visitor flows.

Insert Figure 3 here

Figure 3 is divided into two maps. The first one, Valencia Hinterland, illustrates the intensity of cruise visitors who move beyond the port city (2.5% of the sample). To build the map, the entire region is divided into 1×1 square kilometers, and the number of people in each square is counted. As shown in the Valencia Hinterland map, the nodes are mostly concentrated in the port city, with the nearer cruise hinterland nodes receiving between 25% and 50% of the cruise visitors and the far nodes showing the lowest intensity. The second map, Valencia City Nodes, is a heat map showing the concentration within the port city boundaries, in which the color gradation indicates the intensity in terms of the number of cruise visitors (light green indicating low intensity, and red indicating high intensity). It is a graphical representation of data that enable us to perceive density points, where the individual values are represented as colors from the lowest to highest intensity. GPS devices recorded the position of each participant every 15 seconds. Therefore, a high density of points in the same space means a high number of people and time consumption. The findings reveal that the spatiotemporal behavior of the single- and multiple-node visitors within the port city contributes to 97.5% of the sample. Node 2 has the highest level of cruise visitor flows, node

[1] When we introduced the inverse Mill's ratio in our model, we actually obtained slightly worse values on the Akaike and Schwarz information criteria, which are 10.172 and 10.387 for the model with the inverse Mill's ratio and 10.170 and 10.377 for our model, respectively. Given that the lower the value, the better the goodness of fit, this notion supports the finding that sample selection bias should not affect the results. For the sake of space, we are not providing these alternative estimates, but they are available upon request.

493 3 has a medium level of cruise visitor flow, and nodes 1 and 4 have the lowest levels. Thus,
494 cruise visitors in Valencia prefer to visit the city center instead of the modern areas.
495 The distribution flow by nodes visited reveals that 52.5% of the respondents visited a
496 single node, 45% preferred multiple nodes, and only 2.5% explored the hinterland beyond the
497 city nodes (Table 1). Focusing on the results presented in Table 2, we see that by taking the
498 "Multiple nodes" visit as the baseline, the expenditure of passengers categorized as "Single
499 node" visit is significantly greater than the expenditure of passengers categorized as
500 "Multiple nodes" ($t = 5.067$; p-value < 0.05). By contrast, the expenditure of passengers
501 categorized as "Hinterland beyond the city nodes" does not significantly differ from the
502 expenditure of those categorized as "Multiple nodes." Interestingly, these effects are nuanced
503 when the quantile parameters are observed (Table 3). The significant differences for the
504 "Single node" appear only for quantiles 50% and 75%, thereby suggesting that in terms of
505 intra-destination spatial flows, those people who visited a single node (focusing on only one
506 specific area) tended to spend more than those with different spatial patterns (those with
507 multiple node or hinterland visits). Thus, according to the nodes considered, H1 is confirmed.
508 In the case of Valencia, the most visited single node is the historical center of the city (37.2%
509 of the respondents), an area that encompasses the bulk of cultural attractions with a high
510 commercial density and a growing number of tourist-oriented shops and restaurants.
511 Insert Table 3 here
512 *Onshore visit choice.* Onshore visit choice has a significant and positive parameter
513 that shows independent passengers tend to spend more than guided passengers.
514 Consequently, H2 is confirmed because both types of visitors show different expenditure
515 patterns. However, this significance is not constant throughout the expenditure distribution.
516 Specifically, only quantiles 10%, 25%, and 50% are significant (with a statistically

517 significant increase from quantile 25% to 50%), and with no effect on the highest
518 expenditures (quantiles 75% and 90%).

519 *Cruise category.* Cruise category has a significant and positive parameter for
520 "Luxury," which means that its impact on expenditure is greater than that of "Standard."
521 Therefore, this result supports H3, which states that the spending patterns of cruise visitors
522 are influenced by cruise category. Nonsignificant parameters are obtained for "Premium" and
523 "Exclusive."

524 *Control variables.* The results for the control variables are heterogeneous. Gender
525 does not show an effect on expenditure, a finding that is in line with previous studies
526 (Gargano and Grasso 2016; Henthorne 2000). Age (over 65 years) also has a negative effect,
527 which echoes the findings of Parola et al. (2014). Note that this negative effect of age
528 emerges in the quantiles 50%, 75%, and 90% (with a statistically significant increase from
529 quantile 50% to 75%), suggesting that for higher levels of expenditures, people aged over 65
530 years tend to spend less than any other age group.

531 Surprisingly, income shows no significant differences, which means there are other
532 factors that better explain passenger expenditures. In terms of country of residence, when the
533 "Others" category is taken as the baseline, only the UK, the USA, and Canada have
534 significant parameters with negative effects. Nevertheless, not only are these effects non-
535 general for these three countries (according to the quantiles' coefficients), but all other
536 countries indicate that one or more quantiles are significant. This outcome presents some
537 directions for future research, which needs to cross-analyze both country and level of
538 expenditures. Meanwhile, for those passengers who visited Valencia for the first time, a
539 significant and negative parameter is obtained only for quantiles 25% and 90%. Brida et al.
540 (2014) also found a negative relationship between first-time visitors and expenditures.

Overall satisfaction presents a significant and positive effect on expenditures, which agrees with the findings of Parola et al. (2014). The effect of length of visit is also significant and positive, in line with the findings of Domènech, Gutiérrez, and Anton-Clavé (2020) and Parola et al. (2014), with a growing parameter for each quantile until quantile 75% (quantile 90% is not significant). As expected, group size has a significant and positive effect derived from quantiles 25% and 50%. Brida et al. (2014) reported similar results. As we are using expenditure per capita, the positive influence of this variable means that larger groups prompt a higher predisposition to spend by each individual. First-time cruising does not have any effect on expenditure, which agrees with the findings of Marksel, Tominc, and Bozicnik (2017).

To enrich the results, we conducted a cluster analysis to detect the profile of passengers with high (low) expenditures, stemming from the variables "mobility pattern of cruise visitors," "onshore visit choice," and "time spent at a destination" (the variable "cruise category" is excluded because it does not seem to fully discriminate among the different categories in a general fashion—recall that only the category "Luxury" was significant). We resort to the Ward hierarchical cluster analysis algorithm, which uses the previous three variables as inputs. To detect the number of segments that optimize these inputs, Lewis and Thomas (1990) suggested attaining 65% of explained variance as long as a minimum of 5% increment is obtained in that variance after the addition of a new segment. Table 4 shows that five segments comply with these criteria. In fact, Table 5 presents the different characteristics and, as expected, distinct patterns are found for the three inputs utilized. The levels of expenditures among the five market segments are also significantly different at 0.01 according to the ANOVA test ($F = 4.96$; p-value = 0.001).

Insert Table 4 here

565 The Scheffe test shows that the five clusters can be grouped according to the
566 expenditure level into 2 and 4, 1 and 3, and 5. The clusters with high expenditures are 2 and
567 4, which comprise the largest proportion of independent visitors (90.9% and 89.8%) who tend
568 to stay longer at the destination (7.1 and 6.1 hours) and visit multiple nodes (62.1% and
569 59.2%). Cluster 5 shows the lowest expenditure level; this cluster includes people who opt for
570 independent visits (72.2%) but tend to visit just one single node (88%) and stay only 2.7
571 hours at the destination. Finally, clusters 1 and 3 present an in-between level of expenditures,
572 characterized by people who visit a single node and stay between 3.9 and 5 hours. Cluster 1
573 has a proportion of 79.1% independent visitors while cluster 3 has 53.7%.
574 Insert Table 5 here
575

576 **5. Discussion**

577 The results suggest that the different mobility patterns associated with the cruise passengers'
578 visit to the destination differently influence these passengers' expenditures. Onshore visit
579 choice has a significant effect, with independent visitors showing higher levels of expenditure
580 than do guided ones. The cruise category "Luxury" is the only one that has an impact on
581 expenditures. Regarding the control variables considered, significant and positive effects are
582 found for length of visit, destination satisfaction, and group composition. By contrast,
583 negative impacts are observed for first-time visitors and some countries of residence,
584 although only at certain expenditure levels.
585 This study is the first attempt to develop the pioneering intra-destination tourist
586 movements models proposed by McKercher et al. (e.g., Lew and McKercher 2006;
587 McKercher and Lau 2008) in the cruise context and, specifically, as a driver of cruise
588 passengers' expenditures. The theoretical models of tourist movements are used to categorize
589 the spatial patterns of visitors into a single-node or multiple-node visit. Instead of considering

590 the destination area as a homogeneous tourist space, intra-destination models and their
591 empirical tests allow a more accurate analysis of spatial processes and their connection with
592 expenditure patterns.

593 The research reveals that visitors who stay in a single node spend more than those
594 who tend to move to multiple nodes, with the exception of those independent visitors who
595 visit multiple nodes and stay longer at the destination, thus also showing high levels of
596 expenditure. This pattern is in line with Domènech, Gutiérrez, and Anton-Clavé (2020), who
597 pointed out that the longer time visitors spend in attractions, the higher their spending
598 patterns will be. Our results confirm that the historical center, where most of the cultural
599 attractions are located, is the most visited single node. Thus, cruise visitors in Valencia
600 contribute to the tourist saturation of certain streets in the historical center, prompting the
601 transformation of some traditional retail services into tourist providers.

602 Understanding tourist movements within a destination may help local stakeholders
603 efficiently allocate their resources and manage their tourism products (Zoltan and McKercher
604 2015). Additionally, the link between spending and the spatial distribution of tourists within a
605 destination is a key factor to analyze the balance between the positive and negative impacts
606 of cruise tourism and manage the social perceptions of the cruise industry from a community-
607 based tourism approach. Del Chiappa, Lorenzo-Romero and Gallarza (2018) highlighted the
608 skepticism of the local community—especially of citizens living close to tourist areas—about
609 the alleged positive impact of cruise activities on the city's welfare. Thus, the local
610 administration should implement measures to avoid the negative externalities associated with
611 cruise visitors. For example, it can redistribute the tourist flow to secondary and tertiary
612 tourist nodes by providing additional information about these areas and improving the
613 channels through which such information is sent to or accessed by cruise passengers. It can

614 also consider changing the transport stops of cruise passengers to the city center, although
615 doing so will require collaboration with cruise companies and destination agents.
616 The results for onshore visit choice are particularly interesting given that most
617 previous studies mainly focused on independent cruise visitors. Our methodology reveals that
618 the differences in the expenditure patterns of visitors are not constant across all onshore visit
619 choices. Indeed, only expenditures below the average are significant. As for higher levels of
620 expenditure, both types of visitors seem to behave similarly. Therefore, destination managers
621 should focus on redistributing tourist flows and boosting the appeal of other areas (nodes)
622 within the destination by creating new and attractive experiences, with increasing the amount
623 of average expenses being the final goal. Although offering new excursions is a theoretically
624 plausible measure to fight overtourism and the other negative effects of tourism (UNWTO
625 2018), a recent study conducted in Barcelona and Valencia (Navarro-Ruiz, Casado-Díaz, and
626 Ivars-Baidal 2019) revealed that offering excursions continues to encourage visits to iconic
627 attractions.
628 Except for "Luxury," other cruise categories do not show any effect on the
629 expenditures of cruise passengers even if high-category cruises (e.g., "Exclusive") are
630 afforded by wealthy passengers. This result can be attributed to the shore excursions being
631 included in the cruise package price. Therefore, cruisers from exclusive vessels discover the
632 destination by joining a tour where everything is scheduled and where they are rarely
633 afforded some free time. From the managerial perspective, this result can facilitate the
634 planning of ship arrivals. The cruise industry's strategy of selling itineraries instead of
635 destinations (Rodrigue and Noteboom 2013) also makes these destinations vulnerable.
636 Cerchiello (2017) highlighted the high volatility of cruise port traffic in Spain given that no
637 other port in the area has grown steadily since the beginning of this century. Given the weak
638 negotiating capacity of the port of call and the lack of studies on the other possible effects of

cruise category, the low level of expenditure in all cruise categories must be taken into account in negotiations with shipping companies.

The ancillary cluster analysis performed shows that the three variables of "mobility pattern of cruise visitors," "onshore visit choice," and "time spent at a destination" can discriminate the spending patterns of visitors. Thus, besides the theoretical and managerial values of the individual effects of these variables, this research shows that they are valid dimensions to be used jointly as inputs to unearth different spending behaviors.

6. Conclusion

This study introduces three drivers of cruise visitors' expenditure that have not been examined in previous research, namely, spatial behavior of cruise passengers (mobility patterns associated with the visit), onshore visit choice (independent or guided passenger), and cruise category (standard, premium, luxury, or exclusive ships). The use of QR analysis allows for the incorporation of an additional dimension, namely, the effect of the proposed variables on the expenditures of different cruise passengers. An empirical analysis is also performed in the port of Valencia, a city in Spain that is becoming an important urban and cruise tourist destination in the Mediterranean region.

Mapping spatial movements in an urban destination is crucial for policy makers to be cognizant of cruise visitors' behavior in a limited period of time. The results of this study have different implications for tourism policies derived from an increased knowledge of the interaction between the spatial intra-destination movements of cruise passengers and their expenditure levels. These implications would start at the negotiation phase with shipping companies, as the study findings show that cruise category is not a relevant explanatory factor of direct expenditures at the destination. The most paramount managerial implication, however, is probably the possibility of influencing visitors' spatial behavior by using

664 marketing tools (e.g., information about the destination in key stages of the travel cycle),
665 innovative product design (e.g., new excursions off the beaten track) and local transport
666 system management (e.g., routes, stops, frequency), thus avoiding the congestion of tourist
667 areas, improving visitors' experience and optimizing their expenditure patterns.

668 The limitations of this work must be highlighted. First, this study considers a simple
669 categorization of mobility patterns, including single-node, multiple-node, and hinterland
670 visits. Moreover, this classification strongly depends on how these nodes are defined. Using
671 more complex categorizations and more accurate delimitations of each node can help shed
672 light on this phenomenon. Second, the intra-destination behavior examined in this work
673 considers only two dimensions: spatial and temporal. Therefore, the proposed model must be
674 extended to investigate both the spatiotemporal dimensions and the interaction with the
675 attractions themselves (e.g., the way tourists interact with attractions, whether their visit is
676 superficial or deep, and/or their felt emotions). Third, this study considers only one port
677 destination (Valencia) and does not take into account the stage of the trip the passengers are
678 in when they get to the city (e.g., first day; half-way of the journey). Further research is
679 needed to assess the impact of these aspects on the onshore expenditure of cruise passengers.
680 Fourth, regarding the guided passengers, this work assumes that their spatiotemporal
681 behavior matches that of the person guiding the group. Future research should consider the
682 individual use of GPS devices with guided passengers so that their mobility patterns could be
683 conveniently analyzed.

684 Regarding the way to measure cruise passengers' expenditures, while recall
685 expenditure data have been widely used in other contexts, future studies could implement
686 more objective measures of expenditures, such as the collection of tickets from all the
687 expenses made by cruisers at the destination. Additionally, while keeping the necessary
688 balance between survey cost and response quality, further research should use larger samples

689 to examine the effect of the proposed variables on each type of expenditure (e.g., attraction
690 tickets, local souvenirs, food and beverage). Moreover, since the exact distribution of tour
691 price among the different types of expenditures is not known, the decision is made to
692 eliminate this price in order to analyze direct expenditure in the destination without this bias.
693 Future research should seek the collaboration of tour operators and shipping companies to
694 access disaggregated information on tour pricing. This information would be of particular
695 relevance in determining the direct economic impacts on destinations in a more accurate
696 manner.

697 Finally, the study focuses only on spenders, and thus results should be generalized
698 only to them. Further research is needed to examine the proposed effects on non-spender
699 cruisers as well. Results show that cruise visitors spend little at the destination, but their
700 expenditure levels are as low as those reported in previous studies and in similar contexts.
701 Although this is not necessarily a limitation, this outcome reinforces the debate surrounding
702 the (dis)advantages of this form of tourism (Vayá et al. 2018), considering that the
703 expenditures of cruise passengers in a port of call are only part of the overall economic
704 benefit that this industry generates (Dwyer and Forsyth 1998; Gouvela and Eusébio 2018).

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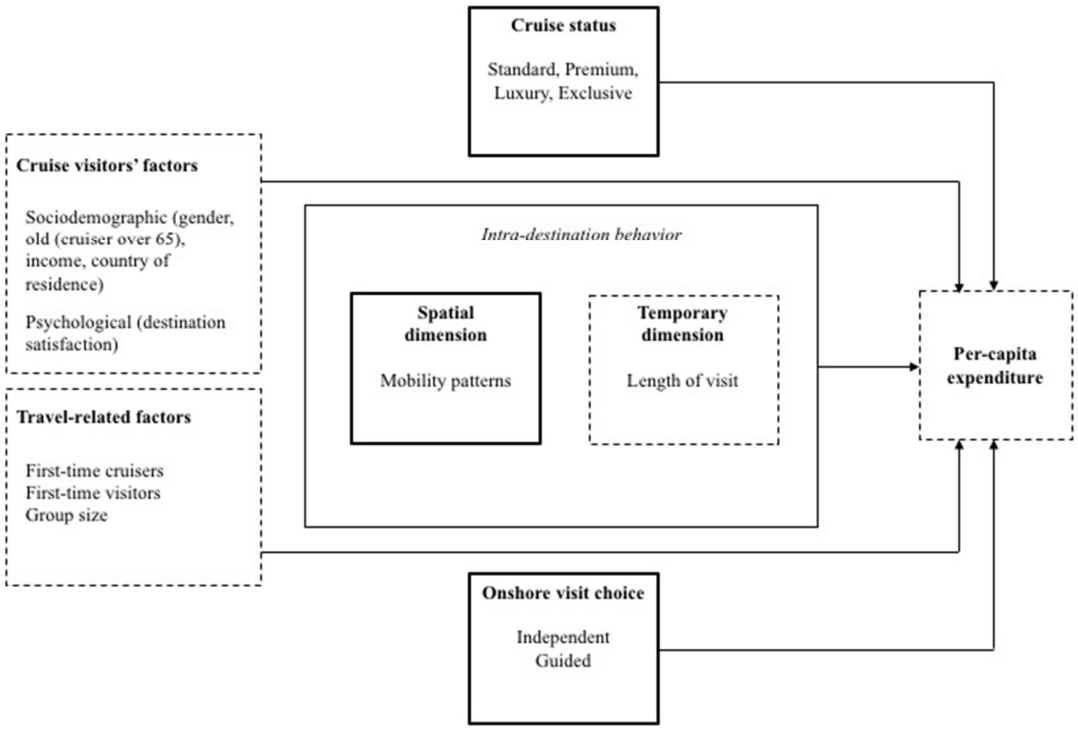
970 Figure 1. Conceptual model of cruise visitors' expenditure



971

Figure 2. Valencia location and nodes examined

Cruise Services

Terminal

Shuttle Stop

Dock

Local Bus Stop

NODES
Node 1: Bioparc
Node 2: City Center
Node 3: City of Arts and Sciences
Node 4: Marina Real & Sea promenade

975 Figure 3. Intra-destination behavior of cruise visitors in Valencia

976
977

978 Table 1. Summary of the main drivers of cruise passengers' expenditure

Variable	Categories	N (487)	% Valid
Gender	Female	309	63.4
	Male	178	36.6
Old (cruiser over 65 years)	66 or above	138	28.3
	Other	349	71.7
Total monthly household income	Less than 1,000 €	6	1.2
	1,000 € –2,000 €	59	12.1
	2,001 € –3,000 €	63	12.9
	3,001 € –4,000 €	77	15.8
	4,001 € or more	171	35.1
Country of residence	United Kingdom	119	24.4
	Italy	88	18.1
	United States of America	59	12.1
	Germany	60	12.3
	France	54	11.1
	Australia	30	6.2
	Canada	18	2.8
First-time cruisers	First time cruising	116	23.8
	Repeaters	371	76.2
First-time visitors	First time in Valencia	374	76.8
	Repeaters	113	23.2
Onshore visit choice	Independent	386	79.3
	Guided	101	20.7
Cruise category	Standard	109	22.4
	Premium	271	55.6
	Luxury	67	13.8
	Exclusive	40	8.2
Mobility patterns	Single node	256	52.5
	Multiple nodes	219	45.0
	Hinterland beyond the city nodes	12	2.5
Group size	Mean = 2.61 (sd = 1.29)		
Destination satisfaction	Mean = 6.46 (sd = 0.86)		
Length of visit (hours)	Mean = 4.76 (sd = 1.32)		
Per capita expenditure	Mean = 35.76 (sd = 39.10)		

979

980 Table 2. Explanatory variables of cruise passengers' expenditure

	Parameter	SD
Mobility pattern		
Single node	5.173[c]	2.111
Hinterland beyond the city nodes	10.976	12.043
Onshore visit choice: Independent	9.031[a]	2.411
Cruise category		
Premium	3.432	2.509
Luxury	7.64[c]	3.597
Exclusive	4.912	3.842
Gender: Female	2.172	1.817
Age: Over 65 years	-3.637[d]	1.873
Income		
2,001 € –3,000 €	2.659	2.913
3,001 € –4,000€	-0.325	2.541
4,001 € or more	1.545	2.288
Country of residence		
UK	-7.873[c]	3.458
Italy	4.731	4.184
USA	-10.854[b]	3.960
Germany	-5.4	3.660
France	-1.579	3.885
Australia	1.129	4.976
Canada	-9.162[d]	5.397
First time in Valencia	-2.982	2.221
Visit satisfaction	1.719[d]	0.969
Length of visit (hours)	0.095[a]	0.015
Group size	1.592[d]	0.961
First time cruising	1.813	2.627
Constant	-27.917[b]	8.920
Pseudo R-squared	0.131	

981 [a] prob < 0.001, [b] prob < 0.01, [c] prob < 0.05, [d] prob < 0.10.

982

983 Table 3. Quantile parameters

	10%	25%	50%	75%	90%
Mobility pattern					
Single node	2.402	1.411	5.173[c]	8.847[c]	-7.857
Hinterland beyond the city nodes	-4.644	-1.244	10.976	24.342	16.63
Onshore visit choice: Independent	2.976[d]	3.826[c]	9.031[a]*	4.631	2.966
Cruise category					
Premium	2.898	2.172	3.432	4.978	-9.201
Luxury	3.769	1.754	7.64[c]	3.443	-8.355
Exclusive	0.705	1.397	4.42	12.698	15.644
Gender: Female	-0.415	-0.521	2.172	1.524	-2.871
Age: Over 65 years	-0.898	-0.654	-3.637[d]	-11.901[b]*	-18.246[c]
Income					
2,001€ −3,000 €	0.383	0.638	2.659	-3.492	-0.193
3,001 € −4,000€	-0.59	-2.674	-0.325	0.29	-11.264
4,001 € or more	0.019	-2.26	1.545	7.788	3.351
Country of residence					
UK	-2.906	-5.331[c]	-7.873[c]	-20.564	-56.23[b]
Italy	-2.447	-1.47	4.731	-8.527	-53.441[b]
USA	-4.265	-5.739[d]	-10.854[b]	-22.508	-35.02
Germany	-1.356	-4.385	-5.4	-22.261	-65.449[b]
France	-1.946	-2.75	-1.579	-17.717	-36.067[d]
Australia	-2.553	-3.853	2.92	-10.046	-53.726[b]
Canada	-4.977	-9.241	-9.162[d]	-18.896	-31.771
First time in Valencia	-1.662	-3.918[c]	-2.982	-2.996	-18.707[d]
Visit satisfaction	1.291	-0.187	1.719[d]	2.523	4.659
Length of visit (hours)	0.062[a]	0.08[a]	0.095[a]	0.126[a]	0.064
Group size	1.076	1.149[d]	1.592[d]	2.196	-2.659
First time cruising	0.341	-0.049	1.813	3.243	11.768
Constant	-21.919[b]	-7.825	-27.917[b]	-13.999	101.884[c]
Pseudo R-squared	0.106	0.124	0.131	0.087	0.139

984 [a] prob < 0.001, [b] prob < 0.01, [c] prob < 0.05, [d] prob < 0.10.
985 * Significant differences at 5% are found between the quantile estimate with asterisk and the previous one. The
986 Wald statistics regarding the slope equality tests among all quantiles are available upon request.

987 Table 4. Segments based on mobility patterns, onshore visit, and time spent at the destination

No. of Segments	σ^2*	σ^2(%)*	Explained Variance	$\Delta\sigma^2$*
10	83481	2.13	0.61	97.87
9	107412	2.75	0.95	97.25
8	144548	3.70	1.12	96.30
7	188478	4.82	1.46	95.18
6	245481	6.28	1.69	93.72
5	311504	7.97	2.61	92.03
4	413626	10.58	8.30	89.42
3	738238	18.88	16.61	81.12
2	1387765	35.49	64.51	64.51
1	3910432	100.00	0.00	0.00

988 *Intra-group variance.
989

990 Table 5. Characteristics of the segments and expenditure levels

	Single node	Multiple nodes	Hinterland beyond the city nodes	Independent	Length of visit (hours)	Per capita expenditure
Cluster 1	40.7%	52.5%	6.8%	79.1%	5.08	33.36
Cluster 2	28.8%	62.1%	9.1%	90.9%	7.11	45.63
Cluster 3	50.2%	44.9%	4.9%	53.7%	3.92	33.59
Cluster 4	30.6%	59.2%	10.2%	89.8%	6.11	42.82
Cluster 5	88.7%	11.3%	0.0%	72.2%	2.74	17.75

991

992

Appendix

INITIAL QUESTIONNAIRE

ID passenger: #[Nº][DD][MM][YY]		*ID GPS: #[Nº]*		*Time beginning [hh:mm]:*	

1. Is this your first time cruising?

1		YES
2		NO

2. Is this your first time visiting Valencia?

1		YES	
2		NO	3.1. Including this visit, this is your _____ visit in Valencia

3. Sex:

1		Male
2		Female

4. Age:

1		18-25
2		26-35
3		36-45
4		46-55
5		56-65
6		66 or more

5. Level of studies:

1		Basic / Elementary Education
2		Secondary Education
3		High School / College / Vocational training
4		University studies

6. Employment situation:

1		Employed, in work
2		Retired
3		Unemployed (looking for a job)
4		Student
5		Housework
6		Others (person with independent means, military service, etc)

7. Monthly net household income:

1		Less than 1.000€
2		1.000€-2.000€
3		2.001€-3.000€
4		3.001€-4.000€
5		More than 4.000€

8. Country of residence: _____

FINAL QUESTIONNAIRE

ID passenger: #[Nº][DD][MM][YY]		*ID GPS: #[Nº]*		*Time arrival [hh:mm]:*	

9. Who have you visited Valencia with?

1		Alone (go 11)
2		With couple/partner
3		With friends
4		With family (couple and/or children and/or other relatives)
5		With couple and friends
6		With family and friends
7		Others: _____

10. Visit group categorised by sex and age:

		Male	Female
1	From 0 to 5 years		
2	From 6 to 12 years		
3	From 13 to 17 years		
4	From 18 to 35 years		
5	From 36 to 55 years		
6	From 56 to 65 years		
7	66 years or more		
8	TOTAL		

11. In your visit in Valencia, did you purchase:

1	Transport services	☐ Yes ☐ No	Cost (€)	☐ GR		☐ IN
2	Attraction tickets (monuments, museums, aquariums, etc.)	☐ Yes ☐ No	Cost (€)	☐ GR		☐ IN
3	Local souvenirs (memories of the region, *e.g. crafts, gastronomy, decoration, etc*.)	☐ Yes ☐ No	Cost (€)	☐ GR		☐ IN
4	General purchases (clothes, shoes, etc.)	☐ Yes ☐ No	Cost (€)	☐ GR		☐ IN
5	Food	☐ Yes ☐ No	Cost (€)	☐ GR		☐ IN
6	Beverages	☐ Yes ☐ No	Cost (€)	☐ GR		☐ IN
7	Tour price (guided)	☐ Yes ☐ No	Cost (€)	☐ GR		☐ IN
8	Others:_____		Cost (€)	☐ GR		☐ IN
9	**Total today's expenditure**		**Cost (€)**	INDIVIDUAL		

12. Finally, express your agreement/disagreement with the following statements about your perception of your visit to Valencia (1 = Totally disagree, 2 = Disagree 3 = Somewhat disagree, 4 = Indifferent, 5 = Somewhat agree, 6 = Agree, 7 = Totally agree)

12.1	Overall, I am satisfied with my visit to Valencia	1	2	3	4	5	6	7
12.2	I will recommend Valencia as a tourist destination	1	2	3	4	5	6	7
12.3	I will return to Valencia in the near future (2-3 years)	1	2	3	4	5	6	7

Thank you very much for your participation!