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***Detailed Response to Reviewers**

Dear Editor Brian Garrod

Please find enclosed the resubmitted Manuscript JDMM-D-16-00070. We want to thank the editor for specifying us the small style corrections to be made at the manuscript. We have changed the inverted commas to single commas and checked the references.

All coauthors have contributed to the manuscript and its revision on equal terms and agree with its content as resubmitted.

We look forward to hearing from you.

The authors

*Title page with author details

Destinations and crisis. Profiling tourists' budget share from 2006 to 2012

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***Highlights**

- Segmenting incoming tourists to Spain by trip budget allocation
- Relevance of tourist expenditure patterns for destination beyond expenditure volume
- Repeated cross sections to show how segments adapt to the economic crisis
- Segments increasing during the crisis spend less, especially in activities

Destinations and crisis. Profiling tourists' budget share from 2006 to 2012

Abstract

Tourist spending behavior is not only relevant in terms of volume but also in terms of trip budget composition, or allocation (share or proportion of total trip budget allocated to transportation, accommodation or activities). This article aims to profile expenditure patterns before, during, and after the economic crisis, and how they affect destinations. We use clustering methods and compositional data analysis, which is an appropriate statistical approach to analyze share. We segment incoming tourists to Spain by trip budget share using repeated cross-sections of official statistics data (2006-2012). One of the main findings is that segments are heterogeneous in their cutting back on expenditure during the economic crisis, and segments increasing in size during the crisis not only spend less but also have the lowest activity share. Furthermore, we identify one of the segments being particularly attractive for destinations in terms of both total expenditure and expenditure profile, with a high activity expenditure share and usually flying with low cost airlines. We contribute to understanding tourist consumer behavior in terms of expenditure pattern at micro level in times of economic recession and its implications for particular destinations.

Keywords

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1. Introduction

The aim of this article is to contribute to the understanding of expenditure patterns before, during, and after the economic crisis. By expenditure patterns we refer to trip budget share or, in other words, expenditure allocation, expenditure composition, expenditure profile or expenditure distribution (percentage of trip budget devoted to accommodation, transportation, activities, and so on). We segment tourists based on their expenditure patterns and analyze the evolution of segment importance to destinations.

Expenditure-based segmentation has been recognized as having unrealized practical potential for the tourism industry and tourist destinations (Vinnciombe & Sou, 2014). To date, expenditure-based segmentation has mostly been performed using one aggregated expenditure variable. However, the same amount spent on different tourist services has a different impact on the local economy (Hadjikakou, Chenoweth, Miller, Druckman & Li, 2014) and destinations should be more interested in tourist market segments with certain expenditure patterns.

The analysis of expenditure composition also makes it possible to study tourism consumer behavior regarding expenditure reallocation patterns during economic crises. Bronner and de Hoog (2016) found that crises do not always imply giving up holidays but rather cutting back on certain expenditure components by modifying certain trip attributes, by shortening length of stay or by using cheaper accommodation (e.g. Campos-Soria, Inchausti-Sintes & Eugenio-Martin, 2015). Such decisions are visible in the analysis of trip budget share. To our knowledge, Bronner and de Hoog's (2014) is the only study segmenting cutting back strategies among tourists who modify their behavior with the crisis without giving up holidays.

To fulfill the article's aim, we segment European tourists arriving in Spain by air, including both low cost airline (LCA) and legacy airline users, based on how they allocate trip budget to transportation, accommodation and activities. We use repeated cross sections between 2006 and 2012 to observe how segments have spent before, during and after the recent economic and financial crisis, which hit a low in Europe between 2009 and 2010 (Eurostat, 2015). Our choice of Spain as a destination is supported by the facts that it is ranked as the third destination in the world according to the UNWTO; the majority of foreign tourists arrive by air (80% in 2012) and 90.8% are of European origin (ITE, 2013a).

This study provides destinations with much-needed new evidence on tourist expenditure at a more detailed product level (Hadjikakou et al., 2014), as well as understanding of tourist consumer behavior at micro level in times of economic recession and its implications for particular destinations and tourist market segments (Campos-Soria et al., 2015; Sheldon & Dwyer, 2010). This new evidence includes:

- Characterization of different tourist market segments according to trip budget composition.
- Description of the segments using trip and traveler characteristics, including absolute expenditure at destination and length of stay.
- Attractiveness of segments to destinations, and how this evolves.
- Evolution of segments during the crisis.

Furthermore, the study period coincides with the transition of LCA from growth to maturity in Europe. In the case of incoming tourism in Spain, LCA accounted for 31.6% of arrivals in 2006, 48.4% in 2008, 55.7% in 2010 and 58% in 2012 (ITE, 2013b). This has triggered a debate regarding the desirability of attracting these airlines to tourist destinations, given the certainty that airline choice and spending behavior at destination are related (Clavé, Saladié, Cortés-Jiménez, Young & Young, 2015; Laurino & Beria, 2014; Liasidou, 2013). Reduction of transportation costs is visible in the analysis of trip budget share, especially if savings in transportation are used to spend more at destination (Eugenio-Martin & Inchausti-Sintes, 2016; Ferrer-Rosell, Coenders & Martínez-Garcia, 2015; Martínez-Garcia & Raya, 2008).

2. Literature review

It has been widely acknowledged that tourists traveling to the same destination at the same time spend their budgets in very different ways (Legohérel & Wong, 2006) and that has different economic impacts on destinations. Even within at-destination expenditures the same amount spent on different tourist services has a different impact on local employment and added value (Hadjikakou et al., 2014), and destinations should be especially interested in tourist market segments with specific expenditure patterns (notably expenditure patterns emphasizing activities at destination). This notwithstanding, while segmentation based on tourist expenditure has a long tradition, it has mainly been univariate. Since the seminal work by Pizam and Reichel (1979), nearly all segmentations of tourist expenditure have merely identified segments with different overall expenditure levels, such as low, medium and high spenders (Díaz-Pérez & Bethencourt-Cejas, 2016; Dixon, Backman, Backman & Norman, 2012; Hadjikakou et al., 2014; Mok & Iverson, 2000; Saayman, Saayman & Joubert, 2012; Spotts & Mahoney, 1991; Svensson, Moreno & Martín, 2011). This is what Dolničar (2004) calls commonsense or a-priori segmentation. Contrarily, so-called data-driven or a-posteriori segmentation tends to go beyond univariate methods. Only Lima, Eusébio and Kastenholz (2012) have performed a multivariate expenditure segmentation using expenditure by trip budget parts as segmentation base (in other words, absolute expenditure on accommodation, transportation, shopping, and so on).

As opposed to absolute expenditure, trip budget allocation refers to the proportion of expenses allocated to accommodation, transportation, shopping, and so on, within the total trip budget. The study of trip budget share has a solid tradition in economic modeling of tourist expenditure (e.g., Chang, Chen & Meyer, 2013; Coenen & van Eekeren, 2003; Engström & Kipperberg, 2015; Ferrer-Rosell et al., 2015; Fleischer, Peleg & Rivlin, 2011; Lee, Jee, Funk & Jordan, 2015). In this article, we propose taking a step further and segmenting on the basis of trip budget share.

Determining tourist market segments according to trip budget share provides very valuable information that cannot be obtained when doing the same analysis on total expenditure or on absolute expenditure per budget component. The analysis of total absolute expenditure focuses on how much tourists spend, while the analysis of budget share focuses on how tourists spend (in other words, on expenditure pattern, expenditure shape or expenditure

profile; see Ferrer-Rosell, Coenders, Mateu-Figueras & Pawlowsky-Glahn, 2016). The analysis of absolute expenditure by budget parts is somehow stuck in the middle. From a consumer behavior perspective, a high level of expenditure on a given budget part may hide two different situations which researchers may be interested in separating: that of a high budget tourist, with a high expenditure size or volume, and that of a low budget tourist inclined to spend a lot on that particular budget part, with a particular expenditure pattern (Ferrer-Rosell et al., 2016). From a destination perspective, expenditure patterns are crucial in estimating tourism yield at a destination (Hadjikakou et al., 2014).

To put it in another way, interpreting segmentations by absolute expenditures often proves difficult. For instance, Lima et al. (2012), using absolute expenditures by budget parts, identified some segments related to volume and some related to allocation; Dixon et al. (2012) and Hadjikakou et al. (2014), using total absolute expenditure, found that high overall spenders tended to spend more than low overall spenders on all major budget parts. Conversely, Hadjikakou et al. (2014), when using trip and traveler characteristics as segmentation base on the same data, found that there were indeed different expenditure patterns, and that a particular expenditure pattern had an even greater economic impact on the destination than high overall spenders.

A related development is that proposed by Brida, Disegna and Scuderi (2014), who use binary variables of spending/not spending on each budget part as segmentation base. This approach is appealing if the researcher's interest lies not in the amount or proportion spent but in grouping 'visitors who spent at least some money on each of the recorded items, and therefore had positive attitude in spending, rather than putting together those who spent similar amounts of money' (Brida et al., 2014, p. 4549).

European tourism scholars describe the financial and economic crisis starting in 2008 as the deepest in the last decades (Eugenio-Martín & Campos-Soria, 2014), as both deep and global in scope (Bronner & de Hoog, 2014) or, plainly, as the great recession (Cellini & Cuccia, 2015). In 2009, the reduction in gross domestic product in the EU was 6.04%, and the 2007 levels were not attained until 2011 (Eurostat, 2015). The crisis was not seriously felt everywhere in Europe, but it did seriously affect the economies of the main European outbound markets to Spain according to ITE (2013a): the UK, Germany, France, the Nordic countries and Italy (Eurostat, 2015). Economic crises induce changes in behavior by all actors in tourism, beyond merely adjusting quantities and prices. Modifying tourist products by

making them more appealing to customers is often encountered as a response, which makes sense when margins are very narrow (Alegre & Sard, 2015). Different types of destination (seaside destinations, mountain destinations, historical and artistic cities, lake and thermal sites, and hills) adapt differently to crises, and certain destinations are more resilient to tourism crises than others (Cellini & Cuccia, 2015).

With regard to tourists themselves, consumption functions depend on the tourism product and change over time reflecting, among other aspects, income variations (Zheng & Zhang, 2013). When studying the impact of economic crises on tourism consumption, tourism has often been argued to be a luxury good (Bronner & de Hoog, 2016). However, recent empirical evidence is mixed. Within vacations abroad, income elasticity is higher with respect to quality of tourist services demanded than with respect to quantity (Fleischer et al., 2011). Income elasticity is also reported to be asymmetric: in the European case it is lower in periods of lower economic growth (Smeral & Song, 2015). While certain types of high quality travel are indeed a luxury, travel as a whole (especially the main summer holiday) is considered by many as a key factor affecting their quality of life and can be regarded as a necessity. Bronner and de Hoog (2016) identify many products and services that families would cut expenditure on during a crisis before giving up their main summer holiday and provide evidence for the aforementioned impact of holidays on quality of life.

From this, it follows that economic crises affect tourist behavior when traveling more than the decision on whether to travel or not. Many tourists opt to cut back expenditure on certain trip attributes, for instance by reducing the length of stay at destination, by staying at cheaper accommodation, or by traveling to short-distance destinations (Campos-Soria et al., 2015; Smeral, 2010). As the crisis deepens, giving up holidays stays the same but cutting back behavior increases (Bronner & de Hoog, 2014) and most cutbacks are found on undertaking certain activities (Ma, Zhang & Qu, 2015).

Eugenio-Martin and Campos-Soria (2014) and Bronner and de Hoog (2012; 2014) show that tourists are heterogeneous in the way they adapt their travel decisions to the crisis. Dolnicar, Crouch, Devinney, Huybers, Louviere and Oppewal (2008) performed a segmentation of expenditure reallocation when facing an unexpected increase in income. To the best of our knowledge, Bronner and de Hoog's (2014) analysis of consumer heterogeneity with repeated cross-sections is the only segmentation based on economizing strategies when facing income

decreases. By using a household survey, the study identifies segments that give up travel altogether (referred to as pruners), segments that do not economize, and segments that economize, called cheese-slicers by the authors. Among the latter, the study uses the overall cutback percentage as segmentation base to distinguish between heavy cheese-slicers (intention to reduce the trip budget by more than 25%) who tend to stay for shorter periods; moderate cheese-slicers (between 15% and 25%) who tend to economize by using a cheaper form of transportation; and light cheese-slicers (less than 15%) who tend to spend less at destination and stay at cheaper accommodation. Such cutback decisions on different trip attributes during the crisis are observable through trip budget share, which is the segmentation base we use in this article.

3. Materials and methods

3.1. Data

We have used official statistics micro data provided by the *Instituto de Turismo de España* (ITE) for 2006, 2008, 2010 and 2012. The ITE is an official agency of the Spanish Ministry of Industry, Energy and Tourism and produces the bulk of tourism data in Spain. The survey used for this paper, known as the *Encuesta de Gasto Turístico* (EGATUR), follows a repeated cross-section design and gathers information on tourist expenditure. The EGATUR survey is conducted in 19 to 25 major Spanish airports depending on the year. The survey uses CAPI (Computer Assisted Personal Interview) to interview incoming tourists in the boarding area before taking the flight back home. The sample is non-proportionally stratified by country of residence, airport and month (ITE, 2014). The survey belongs to the Spanish official statistics system and forms the basis of the tourism satellite account. To aid expenditure recall, tourists are first asked a battery of questions on what they did during their holiday and they are allowed to provide expenditures on a per-person or per-travel party basis. Data are later on re-expressed on a per-person basis.

The universe in this article is defined as a subset of the EGATUR universe, which consists of European leisure visitors arriving by airplane and spending between one and 120 nights in Spain. Flights from outside Europe are excluded because LCA mostly operate short-haul flights. Multi-stage trips are excluded because the decision on expenditure for these trips is expected to fundamentally differ from that of single-stage trips. Tourists who can only spend zero on accommodation (tourists who own a house at the destination or who stay with friends or relatives) are not considered. Finally, tourists who do not decide how much they spend on certain components or do not pay themselves (package tourists, and trips paid for by gifts or contests) are not considered either because of the inability to observe all expenditure components. The sample sizes are 11,647 (2006); 15,729 (2008); 18,293 (2010) and 19,142 (2012).

The budget share parts included in the EGATUR survey and then used as segmentation base are firstly, transportation (x_1). Secondly, accommodation and food are undistinguishable for full-board, half-board accommodation or bed & breakfast, we therefore merged them to define a joint accommodation and food component (basic expenditure, x_2). This component

includes consumption in bars and restaurants, as well as buying groceries and everyday products in supermarkets. Finally, EGATUR provides an aggregated expenditure for activities and shopping (except groceries and everyday products). To this, we added all conceptually similar expenses of moving around at the destination (public transportation and/or car rented at the destination) in order to build an activities-and-shopping component (discretionary expenditure, x_3). The basic component (food and accommodation) and the discretionary component (activities and shopping) add up to at-destination expenditures. By this we mean expenditure for services provided at destination, regardless of whether they were paid for on the spot, or had been paid in advance in the tourist's country of origin.

3.2. Analysis of share

Using budget share as segmentation base has methodological implications (Ferrer-Rosell, Coenders & Martínez-Garcia, in press). Trip budget share is expressed as proportions within a total, which have to be positive and sum 1. The statistical literature refers to this situation as compositional data (CODA), which are characterized by the researchers' interest in the relative importance of components when compared to one another (Pawlowsky-Glahn, Egozcue & Tolosana-Delgado, 2015). Segmentation with compositional data is a challenging task, because compositional data lie in a restricted space called the simplex, in which the Euclidean distances typically used in multivariate segmentation (e.g., in cluster analysis) are meaningless (Aitchison, 1986; Pawlowsky-Glahn & Buccianti, 2011). Euclidean distance considers the pair of proportions 0.01 and 0.10 to be as mutually distant as 0.51 and 0.60, while in the first pair the difference is 900% and in the second less than 20%.

Even if specialized techniques for compositional data are available (e.g., Pawlowsky-Glahn & Buccianti, 2011), compositional data can also be transformed by means of logarithms of ratios so that they can be subject to standard statistical techniques assuming Euclidean distances (Ferrer-Rosell et al., in press). Log-ratios have the twofold objective of making compositional data statistically treatable and of getting the most from the relative information carried by the data. As a result, 'the most common approach to dealing with compositional data in economics has been the use of log-ratio transformations' (Fry, 2011, p. 319).

Several log-ratio transformations have been suggested in the CODA literature (Egozcue, Pawlowsky-Glahn, Mateu-Figueras & Barceló-Vidal, 2003). In this article, we use the

centered log-ratio transformation (clr) because it is easy to compute and makes the Euclidian distances in the transformed space meaningful (Aitchison, Barceló-Vidal, Martín-Fernández & Pawlowsky-Glahn, 2000; Palarea-Albaladejo, Martín-Fernández & Soto, 2012) and is thus suitable for conducting standard cluster analyses (Martín-Fernández, Buxeda-i-Garrigós & Pawlowsky-Glahn, 2015). The more sophisticated isometric log-ratio transformation (ilr) could also be used with identical results in the case of cluster analysis (Ferrer-Rosell et al., in press; Palarea-Albaladejo et al., 2012).

The clr transformation involves computing the log-ratios of each component over the geometric mean of all components, including itself. In this article, they are the following:

$$y_{i1} = \ln\left(\frac{x_{i1}}{\sqrt[3]{x_{i1}x_{i2}x_{i3}}}\right)$$

$$y_{i2} = \ln\left(\frac{x_{i2}}{\sqrt[3]{x_{i1}x_{i2}x_{i3}}}\right) \qquad (1)$$

$$y_{i3} = \ln\left(\frac{x_{i3}}{\sqrt[3]{x_{i1}x_{i2}x_{i3}}}\right)$$

The *i* subindex identifies the individual. The first log-ratio (y_1) is interpreted with respect to transportation share (x_1), the second (y_2) with respect to basic at-destination share (x_2), and the third (y_3) to discretionary at-destination share (x_3). The log-ratios in Equation 1 are the active variables used in the cluster analysis.

If the *x* variables contain zero expenditures, log-ratios cannot be computed. An obvious initial procedure to reduce zeros is to amalgamate small and conceptually similar components with many zeros into larger ones. For instance, in trip budget research it is useful to aggregate expenditure on all particular activities, including moving around at the destination, as we do.

In certain instances, some zero components follow necessarily from certain individual characteristics and are called essential zeros, structural zeros, or absolute zeros in the CODA literature (Aitchison, 1986). An example is expenditure on accommodation by tourists staying with friends and relatives. Structural zeros tend to present themselves in a large number of

individuals, which are commonly dropped from the analysis. Another typology of zeros is the rounding zero or trace zero; that is, a component which may be present but is too small to be detected and can be replaced by a small value.

In tourist budget research, it is often unclear whether zero expenditures come closer to being essential or rounding zeros. Some tourists may indeed deliberately choose to spend nothing on activities and shopping. In many cases, zeros can be understood as inherent randomness of human behavior (tourists can spend a certain amount on activities and shopping on certain trips, but not on others and so can appear as zeros in surveys of only one trip; see Legohérel, 1998). Fry, Fry and McLaren (2000), and Ferrer-Rosell et al. (2015) claim that even if the nature of zeros is uncertain, they can be replaced by a very small value and thus treated as rounding zeros, provided that they are few in number.

Martín-Fernández, Palarea-Albaladejo and Olea (2011) suggest replacing rounding zeros as:

$$\text{if } x_{id}=0 \text{ then } x'_{id}=0.65\delta_{id} \qquad (2)$$

Where δ_{id} is the smallest detectable proportion for individual i and component d. Then, non-zero values have to be reduced in order to preserve the unit sum:

$$\text{if } x_{id}\neq 0 \text{ then } x'_{id} = x_{id}\left(1-\sum_{x_{id}=0} x'_{id}\right) \qquad (3)$$

Simulations show that this method performs well if the percentage of the replaced zeros is below 10% (Martín-Fernández et al., 2011). In our case, the percentage of replaced zeros is 5.7% for the discretionary component (x_3). The remaining budgetary components contain no zeros. The minimum non-zero amount spent is one euro, which roughly corresponds to the price of a city bus ticket, the entrance to a subsidized museum, a postcard and stamp, or a cheap souvenir. We compute δ_{id} by dividing one euro by the total expenditure of individual i.

An attractive feature of the suggested methodological approach to applied researchers is that once zeros have been replaced and log-ratios have been computed, any standard cluster analysis method can be used (Aitchison et al., 2000).

3.3. Cluster analysis

The large sample size precludes hierarchical methods, and in our article we use the most common partition method, the *k*-means method (e.g. Dolnicar, 2002; Everitt, Landau, Leese & Stahl, 2011; Tuma, Decker & Scholz, 2011). A common criticism of this clustering method is the occurrence of local optima that may be distant from the global optimum. To prevent local optima, we perform fifty replications with randomly selected cases as initial cluster centers. Another common criticism is that the method can be seriously affected by outliers. We eliminate the 0.2% most extreme outliers once log-ratios have been computed. The cluster analysis is made on the log-ratios (active variables) and the pooled data including all years and the final sample size is n=64,672. The alternative of using latent class models is discussed by Ferrer-Rosell et al. (in press).

We take into account different criteria to decide the number of clusters (segments). These criteria are the evolution of the within-cluster sum of squares and the differentiability (Kotler, 1997) of segments: an additional segment is considered only if it adds a conceptually different profile compared to the solution with one less segment. According to the first criterion (Fig. 1), beyond six segments, the gain is minimal and any solution between six and eight segments would be reasonable (within-cluster percent sums of squares 13.45, 11.95, and 10.69, respectively). The second criterion has been determinant in selecting the solution with six segments.

PLEASE INSERT FIG. 1 ABOUT HERE

External variables, sometimes referred to as illustrative variables, are those which do not participate in the cluster analysis but help describe and profile the resulting clusters. Among those, we first consider length of stay and total expenditure at destination per day as variables to assess segment substantiality (Kotler, 1997), in other words, profitability. Second, we consider airline type and trip and traveler characteristics in order to make segments actionable and accessible: in other words, to ensure that effective programs can be formulated for attracting and serving the segments, and that the segments can be effectively reached (Kotler, 1997). In order to measure the association between each segment and each trip and traveler characteristic, we have computed odd-ratios:

$$odd\ ratio\left(segment_i ; category_j\right) = \frac{\dfrac{frequency\left(segment_i \text{ and } category_j\right)}{frequency\left(\text{not}\left(segment_i\right) \text{and } category_j\right)}}{\dfrac{frequency\left(segment_i \text{ and not}\left(category_j\right)\right)}{frequency\left(\text{not}\left(segment_i\right) \text{and not}\left(category_j\right)\right)}} \quad (4)$$

Given the large sample size, the vast majority of relationships are significant at the 0.001 level, and, of those, we select only odd-ratios indicating a strong positive association between clusters and variables for interpretation (higher than 1.25). An odd-ratio equal to 1.25 means that the odds of belonging to a segment over belonging to any other segment are 1.25 times larger when belonging to the trip or traveler category at hand than when belonging to any other category. An attractive feature of odd-ratios is that their interpretation is symmetrical. That is, an odd-ratio equal to 1.25 also means that the odds of belonging to a category over belonging to any other category are 1.25 times larger when belonging to the segment at hand than when belonging to any other segment.

4. Results and discussion

4.1. Descriptive statistics

Table 1 shows the description of trip budget parts in absolute terms, length of stay, at-destination expenditure per day, and trip budget share after zero replacement. Table 2 shows the log-ratios, which are the active variables in the cluster analysis, broken down by year. Table 3 shows the frequencies of traveler and trip characteristics.

PLEASE INSERT TABLES 1, 2 AND 3 ABOUT HERE

4.2. Interpretation of segments

Table 4 shows the mean of each log-ratio for each segment, that is, the segment expenditure patterns. Table 5 shows the odd-ratios higher than 1.25 for each external variable category and each segment, in other words, the traveler and trip categories most associated with each segment. Finally, Table 6 shows segment sizes, segment average daily expenditures at destination and segment average lengths of stay, globally, and per year, and thus includes all information on segment overall expenditure at destination.

PLEASE INSERT TABLES 4 AND 5 ABOUT HERE

Segment 1 represents 19.9% of travelers and is associated with legacy airlines. This segment spends relatively more on transportation than the average tourist and relatively less on the basic component than the average tourist. It is associated with cultural and urban trip motivation, and with undertaking cultural visits. It is also associated with traveling in family, staying in low category hotels, being a repeat visitor and from other European countries, France, Scandinavia or Benelux, and with medium level of income. This segment has the second lowest average expenditure at destination per day (€81.22) and the shortest length of stay (5.1 days).

Segment 2 includes 11.4% of travelers. It has relatively high expenses on transportation and on the basic component, but the second lowest expenditure on the discretionary component, meaning that, in general, it is not associated with undertaking activities. Regarding trip

characteristics, it is motivated by seaside/countryside leisure, stays in higher than 3* hotels and travels with a partner. This segment is associated with the oldest age group, the UK and Ireland, up to high school education and being homemakers or low-level employees. The segment average expenditure at destination per day is €90.18 and the average length of stay is 7.5 days.

Segment 3 includes 5.9% of travelers and is associated with LCA. It has 95.9% of zeros in the discretionary component, meaning that it is associated with not undertaking activities and having the lowest expenditure at destination per day (€75.92). Length of stay is 7.6 days on average. Regarding trip and traveler characteristics, segments 2 and 3 are similar in terms of trip motivation (seaside/countryside leisure), type of accommodation used (hotels higher than 3*), country of residence (the UK and Ireland), level of education (up to high school), age (over 45 years old) and occupation (homemakers and low-level employees), but, segment 3 is additionally associated with low income level, being self-employed, being a first-time visitor, traveling alone and during the low season.

Segment 4 represents 23.7% of travelers. This segment spends relatively less on the basic component and has the second relatively highest expenditure on the discretionary component. This segment is associated with undertaking several types of activities, such as attending sporting and cultural events, nightlife, spa, cultural visits, other cultural activities, and going to theme parks. It is also associated with traveling with friends and for other motivations, being a student, young (15-24 years old), from Austria, Switzerland, Liechtenstein, Scandinavia, or other European countries, and with a university education. Its average expenditure per day at destination and length of stay are €108.36 and 5.6 days.

Segment 5 includes 13.7% of travelers and is strongly associated with LCA. It spends the least on transportation and the most on the discretionary component in relative terms, which means it is the segment that undertakes most activities. It is associated with staying in other types of accommodation and rented apartments, traveling with friends or alone, and traveling for other trip motivations. As far as traveler characteristics are concerned, segment 5 is associated with having a high income, being self-employed, a pensioner, unemployed or a high-level employee, and coming from Italy. Segment 5 has the highest expenditure at destination per day (€143.03), and the longest average stay (9.3 days).

Finally, segment 6, which includes 25.3% of travelers, is the one closest to the average tourist in terms of trip budget composition (it is not far from the average of any log-ratio), and thus it is associated with fewer traveler and trip characteristics. Both expenditure at destination per day (€107.96) and length of stay (7.6 days) are close to the average in Table 1.

4.3. Evolution of expenditure segments during and after the crisis

The period of data used (from 2006 to 2012) increases the usefulness of the segmentation in an important way as it includes periods before, during and after the recent financial and economic crisis, which had its harshest effects on the economies of most EU countries -the most important outbound markets to Spain- between 2009 and 2010 (Eurostat, 2015). The way travelers coped with the crisis can partly be seen through the evolution of the expenditure segments. Of course, some Europeans stopped traveling overseas altogether. The evolution of segments comprising those who continued to travel in terms of size, daily expenditure and length of stay is shown in Table 6. This evolution results from changes in either traveler choices within segments or traveler migration from one segment to another, both being partly a result of their coping behavior. Since the data are repeated cross sections, we cannot distinguish between migration between segments and change of behavior within a segment. However, since segments were derived from the pooled data, their expenditure profile is similar and comparable along time. We thus interpret the evolution of segments as entities rather than that of individual travelers, while being aware that we do not have all the necessary information about coping. The changes that took place between 2008 and 2010 are the key elements of the discourse.

PLEASE INSERT TABLE 6 ABOUT HERE

Table 6 shows that all segments evolve in one way or another between 2008 and 2010, which can partly be attributed to coping with the crisis. The three segments with the highest average daily expenditure at destination (4, 5 and 6) all shrink from 2008 to 2010, and then return to the size they had before the crisis in 2012. These three segments together accounted for 65.6% of travelers in 2008, 56.7% in 2010, and 67.5% in 2012. In none of these segments do we observe a relevant change in daily expenditure or length of stay between 2008 and 2010, which suggests that coping occurred mostly through migration to other segments. According to Table 4, these three segments collectively have the highest discretionary share and the

lowest transportation share. This implies that the aforementioned migration tended to reduce expenditure, especially on activities and shopping at destination.

Segment 1, which has the shortest length of stay, reduced stay at destination even more in 2010 and was the only to reduce daily at-destination expenditure that year. Size and daily expenditure at destination remained about the same. Segment 3, which has the lowest daily expenditure, more than doubled in size from 2008 to 2010. Segment 2 both increased in size and reduced average length of stay from 2008 to 2010. The two segments that increased in size in 2010 are also the two with the lowest discretionary share.

5. Discussion

This article segments tourists arriving in Spain by air based on how they distribute their trip budget. Unlike the usual segmentations based on total absolute expenditure (volume), our analysis contributes by identifying differentiated expenditure profiles and furthering understanding of expenditure patterns (allocation). The same absolute amount spent on a given budget part can hide different situations: a traveler with a high overall budget or a traveler who is inclined to spend a large proportion of the trip budget on that part. As Hadjikakou et al. (2014) point out, the key to highest impact on destinations sometimes lies in expenditure profile rather than expenditure volume.

The use of trip budget share also has several advantages when analyzing expenditure by airline users in an economic crisis. It makes it possible to identify those expenditure profiles most attractive to destinations; it makes some cutting back decisions visible; and it shows how tourists allocate transportation savings in a context in which LCA are prominent.

Budget share are compositional data and cannot be analyzed in a standard way. Some complex CODA methods have tended to frighten off applied researchers. This article shows how methodological concerns in trip budget share segmentation can be solved in a simple way by transforming data using centered log-ratios prior to carrying out any otherwise standard cluster analysis. For instance, the robust k-medoids clustering method (e.g., Park & Jun, 2009) could have been used as an alternative to removing extreme outliers. For more complex statistical approaches beyond cluster analysis, see Ferrer-Rosell et al. (in press) and references therein.

Like Bronner and de Hoog (2012; 2014), we have found heterogeneous behaviors. Our approach differs from that of Bronner and de Hoog (2014) in a number of key ways. Since we survey tourists at the destination, we do not observe those who do not travel (whom Bronner and de Hoog call the pruner segment). We observe actual expenditure behavior rather than intentions, which may be considered to be an advantage; on the negative side, however, we do not have information on the role played by the crisis in the observed expenditure. That notwithstanding, some of the segments we identify bear a strong resemblance. For instance, the consistently heavy spenders in segment 5 seem to correspond to Bronner and de Hoog's non economizers; segment 1, the only one to reduce daily at-destination expenditure in 2010,

resembles light cheese-slicers; and segment 2, which maintains daily expenditure but reduces length of stay, may correspond to the heavy cheese slicers.

6. Conclusions and implications

Associating the segments with external variables, besides making them accessible and actionable (except for segment 6), also leads to some meaningful insights and has implications for the different types of destinations, which display greater or lesser resilience to economic crises (Cellini & Cuccia, 2015). According to the external variables, segment 1 contains much of the so-called historical and artistic city tourism, which is reported to perform well in times of crisis (Cellini & Cuccia, 2015). Segments 2 and 3 have the lowest expenditures on activities and low daily expenditures at destination, corresponding to a large extent to seaside tourism. Regarding segments with a strong presence of LCA users, we find two fundamentally different patterns. Segment 3, with the lowest daily expenditure at destination, and the highest transportation share in spite of traveling with LCA, seems to correspond to an overall low cost tourism profile. Contrarily, segment 5, with the highest daily expenditure at destination and lowest transportation share, seems to reallocate savings on the LCA airfare to at-destination expenditure.

Furthermore, given our repeated cross-section approach and the particular period chosen, our segmentation provides evidence regarding the evolution of expenditure composition segments during the recent economic and financial crisis, which may partly be related to coping behavior. Among the most notable is the size of segment 3 -with the least expenditure and activities undertaken- more than doubling in 2010, similar to findings by Ma et al. (2015). It might prove useful for destinations to offer low-budget and low-involvement activities to encourage members of this segment to engage in at least some activities, for instance by means of destination cards (Zoltan & Masiero, 2012). Aside from segment 3, we have shown that during economic crises many segments change their size and decreases can be expected, especially in spending on activities. It may prove valuable for destinations to increase the flexibility of the products and services they offer to adapt to such changes. These changes are also expected to affect different types of destinations differently (Cellini & Cuccia, 2015). Thus, the diversity of a country's destinations can also be a valuable asset in itself, and can increase the resilience of the country as a whole to tourism crises.

With regard to how attractive the different segments are to destinations, both expenditure profile and expenditure volume have to be taken into account. We have also shown that both concepts are interrelated. Table 6 contains all of the information necessary to describe the expenditure profile segments in terms of expenditure volume. This can be done in different

ways. One option is to multiply the three pieces of information in Table 6 to obtain the total at-destination expenditure accounted for by each segment (in %) and determine how this evolves over time (Fig. 2). The attractiveness of the heavy spending segment 5 can be seen to increase over time, the downward spike of the crisis excepted. Hadjikakou et al. (2014) point to the relevance of expenditure on activities even above total expenditure at destination. Taking everything as a whole, segment 5 -with the highest activity share- can be considered to be the goose that lays the golden egg for destinations, and contains more and more geese laying more and more eggs. Incidentally, even if it may seem surprising at first sight, geese that lay golden eggs prefer to fly by LCA. This confirms the relevance of airline type to destinations and the relationship between airline choice and behavior at destination (Liasidou, 2013). All considerations taken together, destinations should not be less interested in attracting LCA than legacy-airline flights.

PLEASE INSERT FIG. 2 ABOUT HERE

With regard to the contribution of this article to the academic literature, we show the relevance of trip budget composition as a segmentation base, which provides complementary information to that obtained with segmentation by total absolute trip budget. High budget tourists, with a high overall expenditure volume, can be distinguished from low budget tourists inclined to spend on a particular budget part. We also contribute with a simple guide to the statistical treatment of trip budget composition, which boils down to performing standard cluster analysis on transformed compositional data.

7. Limitations and future research

As far as limitations are concerned, a first shortcoming of the study may be the bias arising from expenditure recall problems. Fortunately, longitudinal comparisons are relatively immune to recall bias given the fact that the questionnaire design and data collection mode have remained unchanged. A second shortcoming of our study is that it cannot account for the decision on whether to travel or not during the crisis, which can best be studied using household surveys. On the positive side, since the majority are traveling anyway, their spending behavior can still be observed through surveys carried out at destination, and this shortcoming does not affect the usefulness of the segmentation for destinations. It must also be taken into account that we do not use panel data. Thus, we do not have information on how individual travelers cope with the crisis but only on how coping shows up in the aggregated segment profiles, which result both from behavior changes within a segment and migration between segments. Having said that, the practice of interpreting data-driven segments over time, with the necessary precaution, is what Dolničar (2004, p. 246) calls 'commonsense segment analysis following data-driven groupings'.

Further research on segmentation by budget share should include particular subgroups of tourists for whom it is possible to study other or more detailed expenditure components. For instance, studying tourists on a room-only basis means that accommodation and food can be treated as separate components. The choice of how to aggregate expenditure components depends both on the amount of zeros and which expenditure categories can be meaningfully separated for given subgroups of respondents. Such research could also include data from household surveys about travel, observing non-travelers and domestic travelers in addition to overseas travelers; or even data from general household expenditure surveys, observing other spending categories that may compete with traveling.

Another line for future research is to model trip budget composition from traveler characteristics with log-ratios as dependent variables in a statistical model, as was done by Ferrer-Rosell et al. (2015) with one single cross-section. Recent techniques have been developed to extend such an analysis by modeling log-ratios and the absolute expenditure together in the same model (Ferrer-Rosell et al., 2016). This approach would expand on a key idea of this article: expenditure distribution and expenditure volume provide distinct and complementary information and every effort should be made to avoid confounding them.

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Artwork and tables with captions

Table 1
Descriptive statistics for absolute expenditure and share. Pooled data.

Expenditure variables	Min.	Max.	Mean	St. Dev.
Absolute expenditure on transportation (€)	1.67	5,102.04	202.97	135.98
Absolute expenditure on accommodation and food (€)	16.67	18,200.00	467.16	417.05
Absolute expenditure on activities and shopping (€)	.00	10,051.00	151.14	199.85
Absolute at-destination expenditure per day (€)	4.05	2,230.00	103.62	68.98
Transportation share (x_1')	.0110	.9212	.2768	.1275
Basic share (x_2')	.0577	.9651	.5478	.1439
Discretionary share (x_3')	.0002	.8442	.1754	.1191
Length of stay (days)	1	114	6.86	6.12

Table 2

Descriptive statistics for log-ratios used as active variables in the cluster analysis. Per year and pooled data.

	Min.	Max.	Mean	St. Dev.
2006				
Transportation over geometric mean (y_1)	-2.292	2.540	0.009	0.566
Basic over geometric mean (y_2)	-1.086	3.636	0.745	0.502
Discretionary over geometric mean (y_3)	-4.991	1.616	-0.754	0.798
2008				
Transportation over geometric mean (y_1)	-2.221	2.661	-0.039	0.591
Basic over geometric mean (y_2)	-0.979	3.536	0.726	0.540
Discretionary over geometric mean (y_3)	-5.021	1.529	-0.687	0.904
2010				
Transportation over geometric mean (y_1)	-2.278	2.678	0.116	0.707
Basic over geometric mean (y_2)	-0.990	3.632	0.857	0.707
Discretionary over geometric mean (y_3)	-5.027	1.664	-0.973	1.190
2012				
Transportation over geometric mean (y_1)	-2.285	2.682	-0.059	0.590
Basic over geometric mean (y_2)	-1.087	3.651	0.728	0.546
Discretionary over geometric mean (y_3)	-4.948	1.356	-0.669	0.896
Pooled data				
Transportation over geometric mean (y_1)	-2.292	2.682	0.007	0.625
Basic over geometric mean (y_2)	-1.087	3.651	0.767	0.590
Discretionary over geometric mean (y_3)	-5.027	1.664	-0.774	0.983

Table 3

Frequencies of traveler and trip characteristics. Pooled data.

Variable and category	%	Variable and category	%
Travel group		Time of booking	
Traveling alone	12.34	Booked <1 month beforehand	35.56
Traveling in family	17.12	Booked >1 month beforehand	64.44
Traveling with friends	21.05	Motivation	
Traveling with partner	49.49	Cultural/urban tourism motivation	23.89
Country of residence		Seaside-countryside leisure motivation	46.32
Germany	14.25	Other trip motivations	29.79
Italy	13.32	Nautical sports	
France	7.29	Nautical sports: no	96.92
Benelux	10.27	Nautical sports: yes	3.08
Scandinavia	7.78	Other sports	
Austria, Switz, Liech.	4.31	Other sports: no	95.39
UK and Ireland	37.42	Other sports: yes	4.61
Other European countries	5.36	Nightlife	
Education		Nightlife: no	73.59
University education	63.43	Nightlife: yes	26.41
Up to high school education	36.57	Golf	
Reported income category		Golf: no	98.63
High-income category	24.65	Golf: yes	1.37
Medium-income category	71.29	Hiking	
Low-income category	4.06	Hiking: no	97.73
Repeat visitor		Hiking: yes	2.27
Repeat visitor	22.67	Attendance at sports events	
First-time visitor	77.33	Sporting events: no	97.37
Gender		Sporting events: yes	2.63
Female	45.05	Cultural visits	
Male	54.95	Cultural visits: no	39.54
Age		Cultural visits: yes	60.46
Over 45 pensioner	7.28	Attendance at cultural events	
Over 45 not pensioner	29.54	Cultural events: no	91.26
25-44 years old	52.77	Cultural events: yes	8.74
15-24 years old	10.41	Other cultural activities	
Professional status		Other cultural activities: no	80.72
Homemaker	2.91	Other cultural activities: yes	19.28
Unemployed	2.29	Spa	
Student	5.89	Spa: no	95.84
Self-employed	13.21	Spa: yes	4.16
Low-level employee	4.95	Theme parks	
Mid-level employee	60.64	Theme parks: no	91.16
High-level employee	9.79	Theme parks: yes	8.84
Airline type		Gastronomy	
Legacy airline	31.13	Gastronomy: no	91.61
Low cost airline	67.87	Gastronomy: yes	8.39
Season		Visiting friends and relatives	
In summer season (jul-aug)	19.73	Visiting FR: no	96.32
Not in summer season (sept-june)	80.27	Visiting FR: yes	3.68
Accommodation			
Hotel >3*	26.34		
Hotel 3*	25.19		
Hotel <3*	31.36		
Rented apartment	13.66		
Other accommodation	3.45		

Table 4

Segment log-ratio average profiles. Pooled data.

	y_1	y_2	y_3
Segment 1	.397 (H)	.443 (L)	-.840 (M)
Segment 2	.377 (H)	1.202 (H)	-1.579 (L)
Segment 3	1.593 (H)	2.392 (H)	-3.985 (ZERO)
Segment 4	-.117 (M)	.281 (L)	-.163 (H)
Segment 5	-.836 (L)	.704 (M)	.132 (H)
Segment 6	-.263 (M)	.934 (M)	-.670 (M)
Average tourist	.007	.767	-.774

y_1 log-ratio transportation expenditure over geometric mean
y_2 log-ratio basic at-destination expenditure over geometric mean
y_3 log-ratio discretionary at-destination expenditure over geometric mean
H: High; M: Medium; L: Low

Table 5

Trip and traveler characteristics with highest odd-ratio for each segment. Pooled data.

Characteristic	Odd-ratio	Characteristic	Odd-ratio
Segment 1		**Segment 4**	
Golf: no	3.06	Sporting events: yes	2.11
Cultural/urban tourism motivation	2.01	Cultural events: yes	1.80
Other European countries	1.72	Traveling with friends	1.73
Legacy airline	1.54	Nightlife: yes	1.71
France	1.52	Student	1.70
Cultural visits: yes	1.49	Other trip motivations	1.65
Hotel <3*	1.37	15-24 years old	1.57
Sporting events: no	1.35	Spa: yes	1.56
Other sports: no	1.34	Cultural visits: yes	1.54
Scandinavia	1.34	Other cultural activities: yes	1.36
Medium-income category	1.29	Theme parks: yes	1.35
Benelux	1.29	Austria, Switz, Liech.	1.33
Traveling in family	1.29	University education	1.30
Theme parks: yes	1.27	Scandinavia	1.30
Repeat visitor	1.25	Other European countries	1.26
Visiting FR: no	1.25	**Segment 5**	
Segment 2		Golf: yes	3.53
Spa: no	2.57	Gastronomy: yes	1.95
Cultural events: no	2.57	Sporting events: yes	1.87
Golf: no	2.54	Nightlife: yes	1.87
Sporting events: no	2.37	Low cost airline	1.79
Other cultural activities: no	2.21	Other accommodation	1.67
Seaside-countryside leisure motivation	2.14	Rented apartment	1.56
Gastronomy: no	2.05	Traveling with friends	1.54
Nightlife: no	2.04	Cultural events: yes	1.47
Over 45 pensioner	1.86	Spa: yes	1.43
Cultural visits: no	1.71	High-income category	1.42
Theme parks: no	1.62	Traveling alone	1.42
Hotel >3*	1.62	Other sports: yes	1.39
UK and Ireland	1.56	Visiting FR: yes	1.39
Up to high school education	1.52	Other cultural activities: yes	1.35
Homemaker	1.51	Self-employed	1.34
Over 45 not pensioner	1.38	Other trip motivations	1.33
Traveling with partner	1.35	Nautical sports: yes	1.32
Low-level employee	1.33	Unemployed	1.31
Segment 3[a]		Cultural visits: yes	1.29
Seaside-countryside leisure motivation	3.74	High-level employee	1.28
Nautical sports: no	3.15	Italy	1.28
UK and Ireland	2.76	Over 45 pensioner	1.27
Homemaker	2.71	**Segment 6**	
Up to high school education	1.99	Sporting events: no	1.62
Over 45 pensioner	1.91	Over 45 pensioner	1.35
First-time visitor	1.78	Hotel >3*	1.33
Traveling alone	1.51	Traveling with partner	1.31
Low cost airline	1.46		
Other sports: no	1.43		
Low-income category	1.42		
Over 45 not pensioner	1.41		
Not in summer season (sept-june)	1.32		
Low-level employee	1.30		
Hotel >3*	1.30		
Self-employed	1.28		

[a] Theme parks: no, Cultural visits: no, Sporting events: no, Other cultural activities: no, Nightlife: no, Gastronomy: no, Spa: no, Cultural events: no, and Golf: no had odd-ratios>5 for Segment 3 (zero discretionary expenditure segment)

Table 6

Segment sizes (column percentages), daily expenditure at destination (€) and length of stay (days). Per year and pooled data.

	2006	2008	2010	2012	Pooled data
Size					
Segment 1	23.4%	20.6%	19.4%	17.7%	19.9%
Segment 2	12.8%	9.4%	13.2%	10.5%	11.4%
Segment 3	3.2%	4.4%	10.6%	4.4%	5.9%
Segment 4	21.5%	24.6%	21.8%	25.9%	23.7%
Segment 5	11.0%	14.9%	12.2%	16.0%	13.7%
Segment 6	28.1%	26.1%	22.7%	25.6%	25.3%
Daily expenditure at destination					
Segment 1	77.83	82.78	81.71	81.96	81.22
Segment 2	82.73	84.60	95.86	92.97	90.18
Segment 3	72.31	72.05	75.25	82.25	75.92
Segment 4	102.67	108.45	113.17	107.30	108.36
Segment 5	128.78	147.88	149.66	140.50	143.03
Segment 6	105.64	106.69	111.69	107.41	107.96
Length of stay					
Segment 1	5.6	5.2	4.6	5.3	5.1
Segment 2	8.2	8.1	7.0	7.1	7.5
Segment 3	8.7	8.1	7.5	6.9	7.6
Segment 4	6.4	5.4	5.3	5.5	5.6
Segment 5	10.9	8.6	9.1	9.5	9.3
Segment 6	8.1	7.5	7.4	7.5	7.6

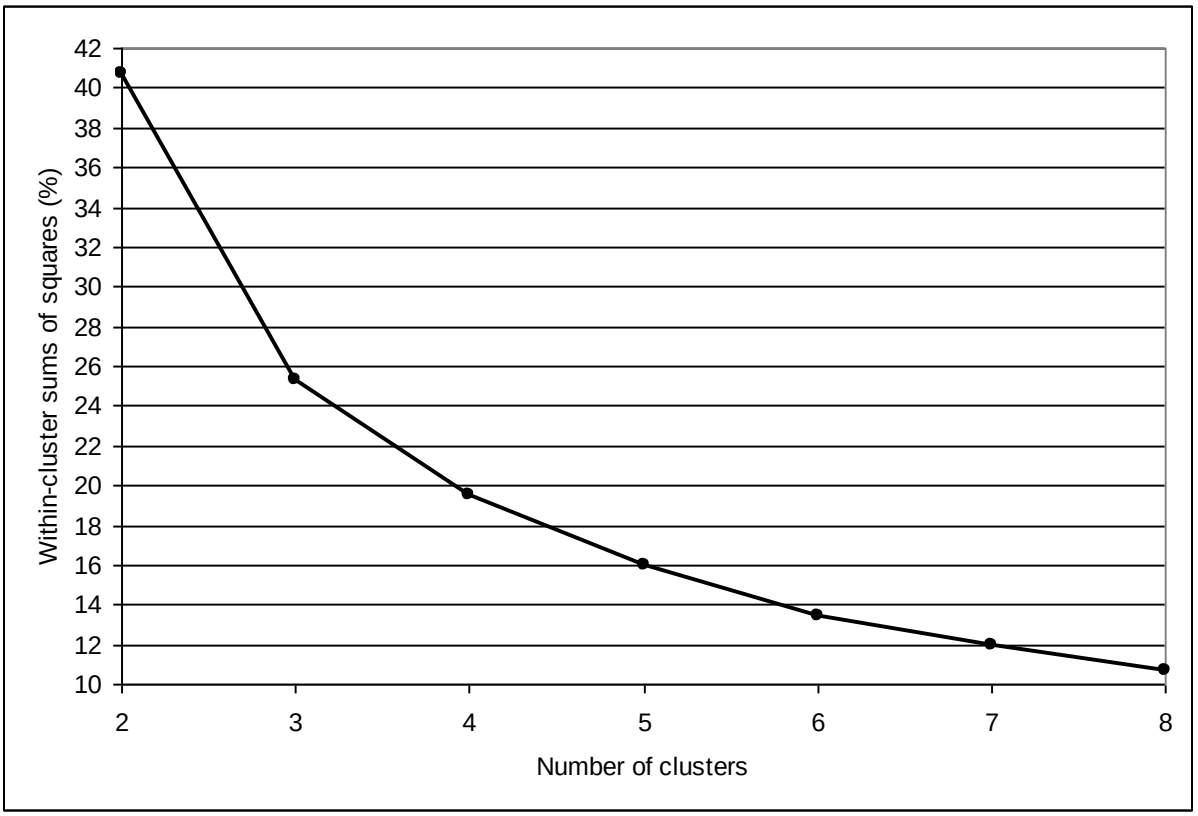

Fig. 1. Evolution of within-cluster sum of squares (best of 50 replications).

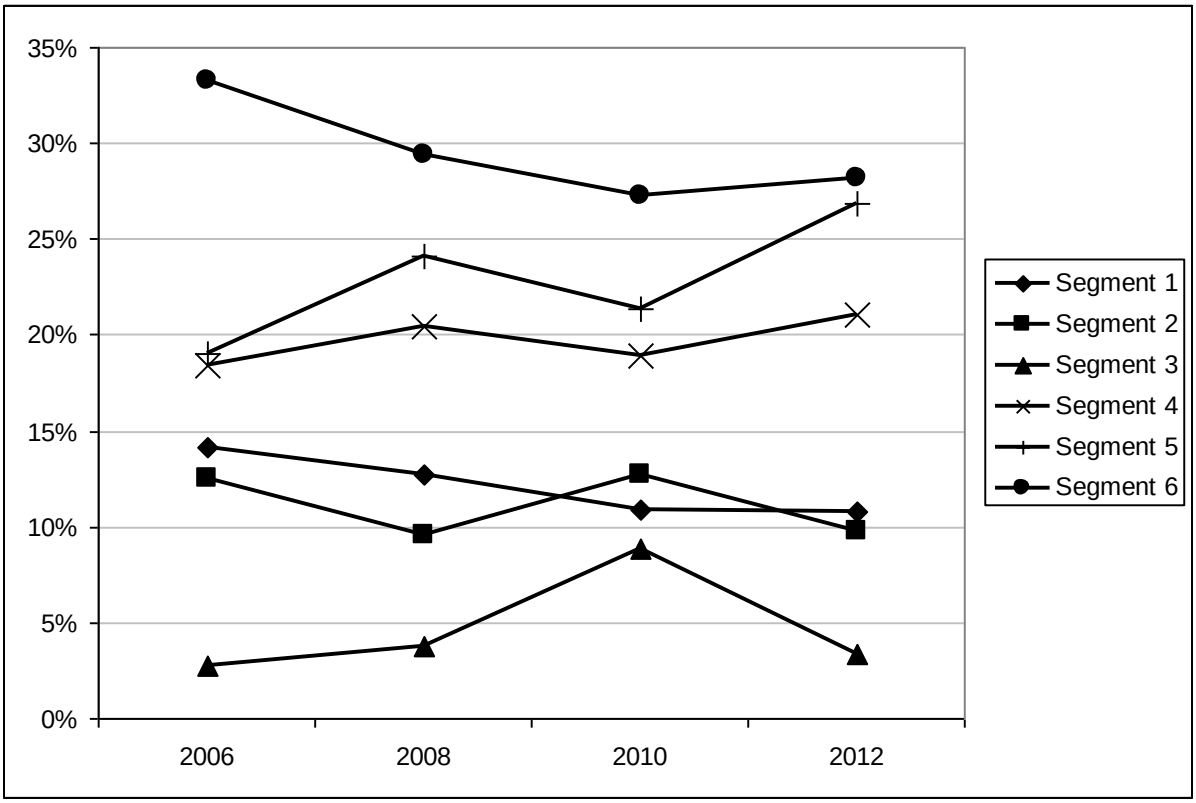

Fig. 2. Segment substantiality for destinations and its evolution:
at-destination absolute expenditure accounted for by each segment (%).