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RELATIONSHIP BETWEEN PRICE SENSITIVITY AND EXPENDITURES IN THE CHOICE OF TOURISM ACTIVITIES AT DESTINATION

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ABSTRACT

The analysis of the drivers of expenditures is a relevant topic that has been studied in the literature; however, the effect of individual price sensitivities to tourism activities on on-site expenditures has received no attention. Price sensitivity is an internal characteristic of the individual related to an external, very influential variable (*price*), and expenditures on tourism activities represent direct income for the destination. On this account, the objective of this study is to analyse the effect of individual price sensitivity on expenditures tourists spend on vacation activities. The operative formalization follows a Mixed Logit Model to estimate the individual sensitivities to price and then, a regression analysis to detect their effect on expenditures. The empirical application finds that price sensitivity has a non-linear quadratic influence on holiday expenditures. Managerial implications are also outlined.

Keywords: tourism activity choice; price sensitivity; expenditures; mixed logit.

1. INTRODUCTION

The analysis of tourist expenses is a critical aspect for destinations as it results from tourist consumption habits and helps assess the impact of tourism on a regional economy (Valdés et al., 2007). In fact, these authors indicate that enhancing tourist expenditures is one of the main aims of the tourist industry in a particular destination; certainly, managers in the travel industry try to get tourists to allocate as much as possible of their discretionary income on tourism spending (Dolnicar et al. 2008; Eugenio-Martin et al., 2008; Thrane and Farstad 2010). Consequently, knowing the determinant factors that lead tourist to spend more of their budget on tourism related activities is crucial (Dolnicar et al., 2008), and it is no wonder that many studies have focused on the examination of travel expenditure and its relation to travel and tourists' characteristics; e.g. socio-demographic, economic, cultural, or life cycle (Jang and Ham, 2009). However, even though prices have been analysed in this stream of research, the individual price sensitivity to tourism activities has drawn less attention in this context, especially when it comes to tourism activities outside the accommodation establishment.

Individual price sensitivity to tourism activities is a relevant element because, on the one hand, it is an internal trait of the individual (*sensitivity*) related to an external, very influential variable (*price*); and on the other hand, dealing with activities individuals take part in at destinations means dealing with expenditures that represent direct income for the destination.

Therefore, the objective of this study is to analyse the effect of individual price sensitivity on expenditures tourists spend on vacation activities. For this purpose, the second section shows the relationship between price sensitivities and expenses, the third presents the research design inclusive of the method, sample and variables; the fourth section explains the results and the fifth summarizes the conclusions.

2. RELATIONSHIP BETWEEN PRICE SENSITIVITY AND EXPENDITURES IN THE CHOICE OF TOURISM ACTIVITIES

Once a tourist is at the destination, s/he is bound to consume the available goods and services and, therefore, to incur expenses (Divisekera, 2009). However, most of the studies about households’ vacation expenditures do not differentiate between travel and on-site expenditures (Fleischer and Rivlin, 2009; Fleischer et al., 2011). These authors indicate that travel and on-site expenditures need to be analysed separately in order to learn the economic motivations behind vacation decision-making. To emphasize this fact, Valdés et al. (2007) state that the analysis of tourist expenditure outside the accommodation establishment is a very useful tool to detect the best segments (those spending the most), to design promotional campaigns targeted towards these segments spending more outside the establishment, and to enhance expenditure in the short run, thereby generating wealth and augmenting the contribution of tourism to the regional economy. Therefore, this article focuses on on-site expenditures outside the accommodation establishment to examine the impact of individual price sensitivity on these expenditures.

Tourists obtain pleasure from activities which they take part in at destinations and local residents support policies aimed at developing the destination in a sustainable way through the use of resources and creation of activities that enhance their well-being. However, tourists' pleasure is obtained in exchange for the price paid and residents' well-being through tourists' expenditures; hence, both "price" and "expenditures" are core elements closely related.

Price is a complex construct that is multidimensional in nature, especially on account of the duality in the effect of price: price can be an index of the amount of sacrifice the individual has to incur to consume the product, as well as the level of quality that the individual might expect (Dodds et al., 1991; Murphy and Pritchard, 1997). In fact, Dodds and Monroe (1985) show that this dual effect affects people's predisposition to buy, and consequently high prices do not always lead to a decrease in the quantity demanded. In this regard, Morrison (1996) points out that the concept of value for money, which compares the amount spent with the quality of installations and service, takes over. It implies that, apart from being regarded as an element enhancing repetition, satisfaction and competitiveness (Stevens, 1992; Petrick, Morais and Norman, 2001; Petrick and Backman, 2002; Petrick, 2004; Chen and Tsai, 2007, 2008; He and Song, 2009), this concept might imply an association of price increases with demand increments.

As for the effect of price on expenditures, it is expected that prices have an influence on the level of expenditure a tourist is predisposed to spend, in line with the negative relationship between price and expenses found by Pyo et al. (1991) and Song et al. (2010). However, Schiff and Becken (2011) suggest going a step further and, on account of today's constant shifts in prices and rather than focusing on the price itself, they recommend going down to the level of individual price sensitivity to understand its effect. Along this line, Nicolau (2009) analyses the effect of individual price sensitivity on holiday expenses without distinguishing between travel and on-site expenditures. This author finds a non-linear influence, showing a smile shaped effect: although tourists with positive price sensitivity are predisposed to spend more on expensive tourist products, and tourists with negative price sensitivity tend to buy cheaper services, buying cheaper products, not necessarily implies spending less money. Also, the concept of value for money could still apply to a price-sensitive tourist as s/he could be predisposed to pay more for a certain level of service, confidence and hedonism. This situation could lead price-sensitive individuals to spend the same amount of money (or more) than another less sensitive tourist (Nicolau, 2009). Paralleling these arguments, we state the following hypothesis of non-linearity within the context of price sensitivity to tourism activities and their related on-site expenditures:

H.1.: *Price sensitivity to tourism activities exerts a non-linear effect on the level of expenditures associated to these on-site activities.*

As a control variable, we follow the work of Thrane and Farstad (2010) and use what they call a "vital variable in this context", which is length of stay. As length of stay represents the "quantity of holiday" bought by the tourist, it constitutes a component of the demand for tourist products (Mak and Moncur, 1979; Silberman, 1985); consequently, a positive association between this variable and tourism expenditures have been reported in the literature. However, recent research finds that the generally positive length of stay-expenditures relationship becomes weaker for trips of longer duration (Downward and Lumsdon, 2003; Fredman, 2008; Thrane and Farstad, 2010), which leads us to try logarithm and quadratic terms to capture this non-linearity.

3. RESEARCH DESIGN

3.1. Sample, Data and Variables

The research proposed is based on data collected within a stated choice experiment conducted among tourists in Ticino (Switzerland) during the summer 2010.

Tourists were asked to state their choice among different alternatives representing combinations of activities at the destination and created according to an orthogonal design. In particular, four groups of activities have been considered, culture and nature, entertainment and sport, evening activities and water activities, respectively. Each group of activity represented an attribute for the stated choice experiment, each composed by three levels (i.e., three activities at the destination). A fifth attribute, with three levels, has been included representing the price of the bundle of activities. Table 1 describes attribute levels either considered as free access or discount access depending on their underlying monetary values. For a detailed description of the stated choice experiment, see Authors (2012).

Table 1 about here

The final sample is comprised of 261 tourists randomly selected in nine different locations of the destination region. Each respondent faced 12 choice situations resulting in 3132 choice observations. Descriptive statistics of the sample for holiday expenditure and length of stay variables are reported in Table 2.

Table 2 about here

The average budget for activities at the destination (excluding accommodation) is 292 CHF[1] and presents a consistent heterogeneity across the sample. The median value for the length of stay is four days with the 90 percent of the sample staying at maximum seven days. As for the age of the tourists sampled, the 70 percent of them are between 31 and 60 years old, 10 percent are older than 61 years old and 5 percent are under 20 years old.

3.2. Method

The individual estimates for price sensitivity to tourism activities are obtained from the stated choice experiment described in section 3.1. In particular, the utility function associated with respondent *n* for alternative *j* in choice situation *s*, is assumed to be linear in parameters and specified as follows:

$$U_{njs} = \alpha_j + \sum_k \beta_{nk} x_{njsk} + \varepsilon_{nj} \tag{1}$$

where, α_j is the alternative specific constant, β_{nk} are the coefficients associated to the *k* attributes (x) considered in the choice experiment and ε_{nj} is the random term that is assumed to be Independent and Identically Distributed (IID) extreme value type 1.

[1] Approximate exchange rate at the time the survey was conducted: 1 CHF = 1.10 USD

The taste heterogeneity is captured by specifying the coefficients to be random distributed across the sample as follows:

$$\beta_{nk} = \beta_k + \sigma_k v_{nk} \qquad (2)$$

where, β_k is the sample mean, v_{nk} is the individual specific heterogeneity with mean zero and standard deviation one, and σ_k is the standard deviation of β_{nk} around β_k, that can follow any probability distribution. In this context, the Normal distribution represents the most commonly used due to its ability to approximate sample distributions. However, other distributions have been proposed and their properties investigated with discrete choice model applications (see for example, Hensher and Greene, 2003; Hess et al. 2006). In particular, specific distributions can be adopted in order to accommodate *a priori* assumptions on the sign of the coefficient[2] and/or to find the specification that best explains *a posteriori* relationships. In this context, this paper proposes five different probability distributions for the coefficient associated with price, comparing them in terms of their explanatory power in a regression to be performed in a subsequent stage (see Equation (5)). In particular, Normal and Triangular distributions are tested in the estimation phase along with three constrained versions, namely, constrained Normal with the standard deviation equal to the mean (CN1), constrained Normal with the standard deviation equal to half of the mean (CN2) and constrained Triangular with the standard deviation equal to the mean (CT1). The constrained versions are introduced in order to avoid (to reduce for CN1) positive signs for the coefficient estimated addressing the *a priori* assumption of non-positive price coefficients. Note, however, that in a tourism context, differently from what is commonly expected in other sectors, the coefficient associated with price not necessarily needs to be assumed strictly positive since there are cases where the price can be perceived as a quality attribute. The individual estimates for price sensitivity are derived starting from the Bayes Identity and then simulated in the estimation process as follows:

$$E\left(\beta_n \mid y_n\right) = \frac{1}{R}\sum\nolimits_r \beta_{nr}\omega_{nr}, \quad \text{where } \omega_{nr} = \frac{L_n}{\sum\nolimits_r L_n} \qquad (3)$$

[2] Indeed, being the Normal distribution unbounded it implicitly allows for both positive and negative values for the coefficient.

where, y_n represents the alternative chosen, $r = 1,...,R$ is the number of draws used in the simulation process for the estimation of the parameters[3] and L_n is the simulated log-likelihood defined as follows:

$$L_n = \sum_n \ln \frac{1}{R} \sum_r \prod_s \frac{\exp\left(\alpha_j + \sum_k \beta_{nk} x_{njsk}\right)}{\sum_j \exp\left(\alpha_j + \sum_k \beta_{nk} x_{njsk}\right)} \quad (4)$$

where, $s=1,...,S$ represents the panel structure of the data (i.e., correlation between choices from same respondent).

In order to investigate the effect of individual price sensitivity on expenditures a regression is then performed, where the dependent variable (E_n) is the expenditures spent exclusively on tourism activities (excluding accommodation) and the independent variables are the individual price sensitivity (i.e. the estimated individual coefficients associated with the price attribute in the stated choice experiment) and length of stay (measured by the number of days at the destination). Formally, the OLS regression takes the following specification:

$$E_n = \alpha + \sum_k \delta_k x_{nk} + u_n \quad (5)$$

where, α is the constant, δ_k the estimated parameters associated to individual specific variable x_k, which are price sensitivity, squared price sensitivity, length of stay, squared length of stay, and logarithm of length of stay (depending on each specification, the squared and logarithm is included in expression 5). As for the individual price sensitivity, the identification is based on the comparison, among the five probability distributions proposed within the mixed logit estimation, of their explanation ability of the dependent variable (E_n). Finally, u_n is the error term that is normally distributed with mean zero and standard deviation σ.

4. RESULTS

We first estimate the price sensitivity for each individual using a Mixed Logit Model with the different distributions indicated in the previous section to find those estimated individual price sensitivities that best explain the level of expenditures. Table 3 shows the estimates for an average individual. Observe that all the results for the

[3] In this paper, 500 Halton draws have been used (for details about Halton draws, see Train, 2009).

mean parameters are robust across the different distributions[4] and, for the variable of interest to this study, i.e. price, it is also robust for its standard deviations. In particular, the price parameter is around -0.039 (unconstrained normal) and -0.061 (constrained triangular), with a standard deviation standing around 0.041 (unconstrained normal) and 0.091 (unconstrained triangular), all of them significant at 0.01%. Consequently, we find that price is significant and presents a negative sign, therefore being a dissuasive factor in the choice of activities. Its standard deviation parameter is significant as well, meaning that "price" has a differentiated effect among the individuals of the sample. The differentiated effect found for "price" suggests that there is a great diversity of sensitivities in the tourist market.

Table 3 about here

Regarding the explanatory ability of these choice models, it falls around 0.123 (constrained triangular) and 0.139 (unconstrained normal) in terms of the McFadden pseudo ρ^2. Note, however, that we are interested in finding the price sensitivity estimates that best explain expenditures; so, in a subsequent stage, we conduct several regression analyses with each alternative distribution. Table 4 presents the criteria employed to identify the best regression, for all the specifications tested: linear, mixed (quadratic and logarithm) and quadratic. The model that appears to be optimum is the quadratic specification of the expenditures regression whose individual price sensitivities are obtained from a constrained triangular distribution.

Table 4 about here

Consequently, we discuss the results of this specification, whose particular estimates are presented in Table 5. The results show that Equation 3, with quadratic terms, has the highest R^2 and Adjusted-R^2, followed by Equation 1 (linear specification) and further away is the mixed specification (quadratic and logarithms). In particular, we observe that the difference in the log likelihoods for Equations 1 and 3 ($1670.10 < -1664.87$) is significant at 1% ($\chi^2=10.45$; $p<0.005$), thus supporting hypothesis H.1 that price sensitivity has a non-linear influence on holiday expenditures. This superiority of the non-linear specification is further confirmed by the Ramsey RESET Test: according to its values shown in Table 3, Equations 1 and 2 suffer from misspecification, while Equation 3 does not seem to need extra variables (for illustrative purposes, Table 4 also

[4] Results for the model with unconstrained Normal distribution are also reported in Masiero and Nicolau (2012).

displays this test for each linear specification, showing the same misspecification, thereby confirming the need to consider non-linearities in the relationship "expenditures-price sensitivities"). By representing this relationship in Figure 1 and 2, we observe that from the minimum estimated price sensitivity of -0.021, tourists diminish their holiday spending until they reach a price sensitivity of -0.063, where the minimum of the curve is obtained. From that point on, they begin to increase spending, which reflects a smile shaped effect in line with the result of Nicolau (2009).

Table 5 about here

Figure 1 shows the theoretical mathematical curve from the parameters estimated in equation 5, with price sensitivities starting from -0.021 and decreasing at a constant rate of -0.0005, producing a perfect smile. Figure 2 presents the empirical curve with the price sensitivities estimated, which are shown in decreasing order in the x-axis starting from -0.021, resulting in an empirical smirk. Should the sample size increase, the smirk would turn a perfect smile.

Figure 1 about here

As for the length of stay, positive and significant parameters are found for both linear and quadratic terms, suggesting a non-linear effect on expenditures in such a way that the positive effect of length of stay on expenditures becomes weaker for trips of longer duration in line with the results of Downward and Lumsdon (2003), Fredman (2008) and Thrane and Farstad (2010).

Figure 2 about here

5. CONCLUSIONS

There is a substantial body of literature dealing with tourism's economic impact at the macro level, but less is known about tourist expenditure at a micro scale (Craggs and Schofield, 2009); however, knowing the determinant factors that lead tourists to spend more of their budget on tourism related activities is critical. The studies that have analysed travel expenditure have not considered individual sensitivity to price in the context of on-site tourism activities. Consequently, in this article, we observe "choice of activities combinations" to estimate "activity price sensitivities" and look for a relationship with the "general expenses at the destination".

The results show that individual price sensitivities have a non-linear influence on holiday expenses. Starting with the lowest price sensitivity, tourists diminish their holiday spending until they reach a certain point; however, as of that point, they begin to increase spending, in line with the idea that a low-price motivated tourist will not necessarily spend less money, and that s/he could be thought to be influenced by the concept of value for money.

As for managerial implications, observe that dealing with activities individuals take part in at destinations means dealing with expenses that represent direct income for the destination, so the analysis of the determinants of the level of expenditures on on-site activities sheds light on the drivers of income-generating factors; that is, understanding the determinant factors that explain a specific level of expenditures is crucial for a destination to manage and analyse its income generated by tourism. Moreover, considering that the driver analysed in this article is price-based, it means that it is completely manageable by decision-makers. Specifically, site operators should, at the very least, be aware of the possible existence of this non-linearity, and then take advantage of the 'smile' price sensitivity relationship based on the following points:

i) Distinction of drivers of travel and on-site expenditures. In line with Fleischer and Rivlin (2009) and Fleischer et al. (2011), travel and on-site expenditures should be analysed separately: a price-sensitive tourist could choose a relatively low priced destination, but s/he doesn't know a priori the amount of money s/he will spend at the destination. Therefore, it could happen that an individual, who is rather sensitive to price, could end up spending the same amount of (or more) money than another quite less sensitive. This pattern can be reflected on our results -the right-side of the smile- and stresses the importance of this distinction between travel and on-site expenditures. On-site operators should be aware that, regardless of the destination character (expensive and non-expensive), there might be a segment that is less sensitive to their prices.

ii) Segmentation. The differentiated effect found for price confirms the existence of a great diversity of price sensitivities in the tourist market. Consequently, profiling the tourist preference structure in terms of prices allows the formation of groups of individuals with similar price preferences; that is, segments formed by price sensitivities. More importantly, this price discrimination is particularly relevant as is based on the preferences of individual people -individual by individual-. At a time when tourists are increasingly demanding and insist on service provision adapted to their specific needs, knowledge of the profile of each tourist allows tourism organizations to offer the most suitable products.

iii) In line with Schiff and Becken's (2011) suggestion, going down to the level of individual price sensitivity to understand the effect of price has proven to be insightful in the sense that the analysis of prices per se does not permit the detection of this non-linearity. Note that decision makers can "obtain" people's price sensitivities by observing the combination of tourist activities selected, which in turn would allow them to classify a tourist and, accordingly, offer him or her a specific provision with varying quality and price. A hotel manager, for example, can "approximate" an individual sensitivity to price by looking at the combination of activities to do at the destination, and then, the manager can offer certain hotel services aimed at this tourist.

Concerning study limitations, note that the empirical application shows significant price sensitivity parameters at 10%. Certainly, although standard, this is not a conservative criterion; so more evidence is needed to back up this outcome. Also, note that we have turned to "value for money" to support the results. Ideally, we should have included the value for money items in the model and test for them. However, we do not have information on quality provision. Finally, note that the sample was not representative of the statistic population, more evidence is hence needed in order to support managerial implications.

Regarding future avenues of research, note that investigating patterns in tourism demand and expenditures in a priori defined segments of tourists has been a widely studied topic (Dolnicar et al., 2008; Eugenio-Martin and Campos-Soria, 2011); however, studies that have formed segments through individual price sensitivities are scarcer. Accordingly, it would be interesting to find whether there are differences in people's price sensitivities for the same activity in two different types of destinations and, if so, whether their existing price-sensitivity-defined segments in both differ in terms of their patterns of expenditures.

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Table 1. Attributes and their levels

Attribute	Attributes levels
Culture and nature	Free usage of cable cars Free entrance to museums Free entrance to botanical gardens
Entertainment and sport	Free entrance to entertainment parks 20% discount on wellness facilities 20% discount on sports and renting sport equipment
Evening activities	20% discount on events and festivals 20% discount in restaurants 20% discount in bars/clubs
Water activities	Free boat trips on the lake Free entrance to Lido 20% discount on renting a boat
Price	30 CHF/day 45 CHF/day 60 CHF/day

Table 2. Sample descriptive statistics

Variable	Mean	Median	Std.Dev.
Holiday expenditure	292.2	200	288.8
Length of stay	4.8	4	5.6

Table 3. Distribution comparison for the stated choice model of tourism activities

	Normal	Constrained Normal (SD= mean)	Constrained Normal (SD=0.5·mean)	Triangular	Constrained triangular (SD=mean)
	Coefficient (*t*-ratio)	Coefficient (*t*-ratio)	Coefficient (*t*-ratio)	Coefficient (*t*-ratio)	Coefficient (*t*-ratio)
Means for Random and Non-Random parameters					
ASC Alt A	2.5405 (15.03[a])	2.5619 (17.12[a])	3.0301 (24.58[a])	2.5210 (14.92[a])	3.1033 (20.39[a])
ASC Alt B	2.4058 (14.23[a])	2.4274 (16.24[a])	2.8948 (23.50[a])	2.3859 (14.13[a])	2.9669 (19.54[a])
Price	-0.0398 (-9.58[a])	-0.0404 (-16.52[a])	-0.0579 (-31.71[a])	-0.0412 (-9.76[a])	-0.0611 (-18.46[a])
Cable car	-0.0742 (-1.45)	-0.0721 (-1.39)	-0.0673 (-1.31)	-0.0733 (-1.43)	-0.0665 (-1.30)
Museum	0.2183 (3.41[a])	0.2143 (3.34[a])	0.2097 (3.25[a])	0.2181 (3.40[a])	0.2135 (3.31[a])
Entertainment park	-0.0714 (-1.42)	-0.0669 (-1.33)	-0.0607 (-1.20)	-0.0717 (-1.43)	-0.0656 (-1.30)
20 % discount on sport and renting s. eq.	-0.0309 (-0.56)	-0.0304 (-0.56)	-0.0305 (-0.56)	-0.0313 (-0.56)	-0.0257 (-0.46)
20 % discount on restaurants and bars	-0.2456 (-2.70[a])	-0.2433 (-2.70[a])	-0.2329 (-2.53[b])	-0.2470 (-2.68[a])	-0.2215 (-2.32[b])
Free boat trips on the lake	0.3516 (6.77[a])	0.3497 (6.79[a])	0.3361 (6.53[a])	0.3528 (6.79[a])	0.3245 (6.27[a])
20 % discount on renting a boat	-0.2484 (-3.76[a])	-0.2518 (-3.81[a])	-0.2656 (-4.00[a])	-0.2480 (-3.75[a])	-0.2530 (-3.81[a])
Standard deviations for Random parameters					
Price	0.0410 (14.73[a])	0.040 (16.52[a])	0.0289 (31.71[a])	0.0984 (14.66[a])	0.0611 (18.46[a])
Cable car	0.1434 (1.01)	0.1693 (1.51)	0.1610 (1.42)	0.1508 (1.14)	0.1342 (1.03)
Museum	0.4724 (7.90[a])	0.4795 (7.92[a])	0.4955 (8.05[a])	0.4725 (7.85[a])	0.4958 (8.10[a])
Entertainment park	0.0057 (0.03)	0.0707 (0.467)	0.0265 (0.152)	0.0046 (0.027)	0.0008 (0.005)
20 % discount on sport and renting s. eq.	0.2059 (2.22[b])	0.1522 (1.09)	0.1400 (0.90)	0.2061 (2.22[b])	0.1956 (1.95[c])
20 % discount on restaurants and bars	0.6380 (5.83[a])	0.5935 (5.52[a])	0.6690 (6.53[a])	0.6787 (6.22[a])	0.7959 (8.37[a])
Free boat trips on the lake	0.3991 (6.86[a])	0.3888 (6.63[a])	0.3981 (6.84[a])	0.4008 (6.88[a])	0.4179 (7.21[a])
20 % discount on renting a boat	0.1462 (1.15)	0.1551 (1.01)	0.2021 (1.72[c])	0.1460 (1.15)	0.1864 (1.74[c])
Sample	3132	3132	3132	3132	3132
Halton draws	500	500	500	500	500
Restricted LL	-3439.76	3439.76	3439.76	3439.76	3439.76
Final Log-likelihood	-2961.66	-2962.66	-2991.25	-2966.45	-3013.72
k	18	17	17	18	17
AIC	1.9033	1.9033	1.9216	1.9063	1.9359
McFadden pseudo ρ^2	0.1390	0.1386	0.1303	0.1375	0.1238

a=prob<1%; b=prob<5%; c=prob<10%.

Table 4. Comparison of price sensitivity explanation ability

	Normal	Constrained Normal (SD= mean)	Constrained Normal (SD=0.5·mean)	Triangular	Constrained triangular (SD=mean)
Linear specifications					
Log likelihood	-1670.09	-1670.10	-1670.11	-1670.10	-1670.11
R^2	0.5760	0.5759	0.5759	0.5759	0.5759
Adjusted R^2	0.5726	0.5725	0.5725	0.5725	0.5725
Ramsey RESET Test	8.12[a]	8.18[a]	8.21[a]	8.19[a]	8.22[a]
Mixed specifications (quadratic and logarithm)					
Log likelihood	-1708.84	-1708.67	-1708.16	-1707.56	-1708.36
R^2	0.4225	0.4233	0.4256	0.4284	0.4247
Adjusted R^2	0.4155	0.4163	0.4187	0.4214	0.4177
Quadratic specifications					
Log likelihood	-1665.47	-1665.37	-1665.08	-1665.32	-1664.88
R^2	0.5913	0.5916	0.5926	0.5918	0.5932
Adjusted R^2	0.5846	0.5850	0.5859	0.5852	0.5866

a=prob<1%;

Table 5. Linear vs. non-linear relationships

Variable	Eq. 1 Linear specification	Eq. 2 Quadratic-Log specification	Eq. 3 Quadratic specification
Price sensitivity	-50.06 (513.15)	7556.95[b] (3122.8)	4084.77[c] (2362)
Price sensitivity^2		61058.49[b] (24179.1)	32450.84[c] (18139.2)
Days	38.17[a] (2.088)		49.98[a] (7.76)
Days^2			-0.28[b] (0.11)
Log(days)		250.20[a] (33.83)	
Constant	66.25[b] (32.29)	119.36 (74.93)	128.14[b] (61.28)
R-squared	0.575	0.428	0.593
Adjusted R-squared	0.572	0.421	0.586
Log likelihood	-1670.10	-1707.56	-1664.87
Ramsey RESET Test	8.22[a]	103.25[a]	0.028
Observations	251	251	251

a=prob<1%; b=prob<5%; c=prob<10%

Figure 1. The theoretical mathematical curve (*the perfect smile*)

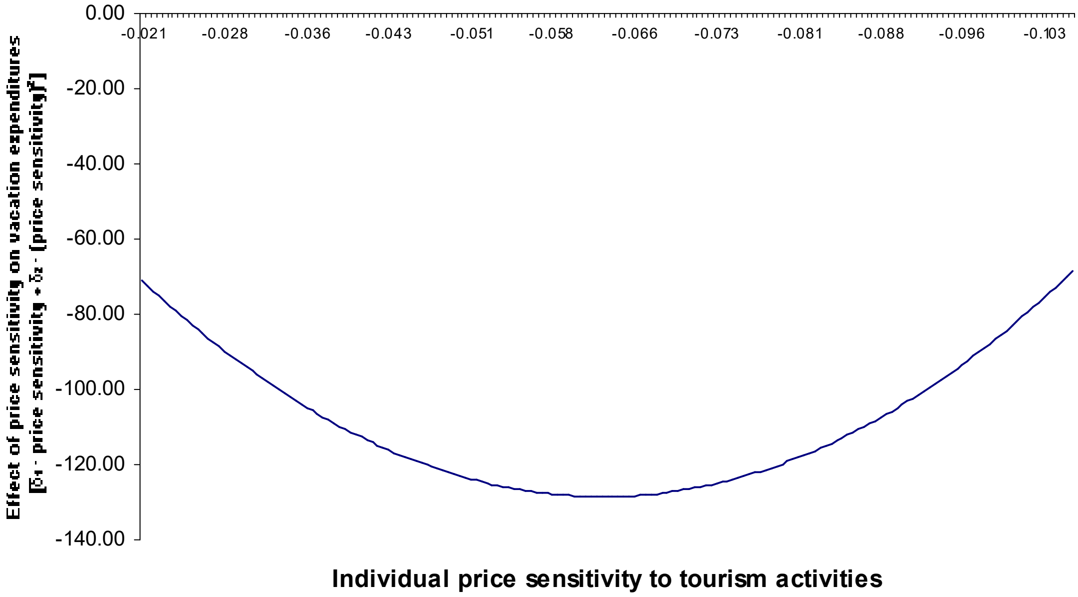

Figure 2. The empirical curve (*the smirk*)