Applying The Contingent Valuation Method in Assessing Urban Parks: the Case of Niarchos in Greece

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Abstract. Urban parks are of great importance for the sustainability in the cities. The multiple influences that the parks and green spaces offer both to humans and to the environment have been widely recognized in the literature and include the physical and mental health of citizens. The urban parks are oxygen sources for cities, they make people feel close to nature, they contribute to the reduction of anxiety and they also offer many activities to the people. The impact of green spaces is of vital importance as they contribute to the reduction of temperature and they offer a cool environment improving the microclimate this way. The purpose of this study is to estimate the value that people attribute to urban parks applying the Contingent Valuation Method (CVM). This value is estimated through urban park visitors’ willingness to pay a hypothetical entrance ticket. For the purpose of our study, a survey was conducted to visitors of the Niarchos Park in Attica, Greece from July of 2018 to February of 2019. Subsequently, the empirical analysis is based on regression models. The demographic characteristics, such as the age, the educational level, the employment and the number of household members were found to be significant prognostic factors for people’s willingness to pay or not in order to use the park, as also the importance that people give to green spaces. The visitors’ expenses for the park visit were also taken into consideration and they are statistically important. The differentiation that may exist between a hypothetical scenario which is presented to the park’s visitors and of a real situation should be taken into account.

1. Introduction
The significance of urban parks has been widely recognized and the benefits which offer in residents of cities were a study’s object of many researches. Urban parks affect the environment in a positive way [1], while they offer multiple recreational activities to people [2,3].

The value that citizens attribute to urban parks is valued with multiple methods and one of the most prevalent is the Contingent Valuation Method (CVM). Previous empirical studies have valued the value of urban parks through people’s willingness to pay a hypothetical entry ticket in order to visit them. Many are the researches which have studied the factors that affect visitors’ decisions for willingness or refusal of payment [4-17]. These factors are about social and demographic
characteristics of people, their satisfaction level from their visit in parks, the frequency of visits and the possible revisit in the future, as also a possible corresponding payment experience in the past.

The aim of this study is to apply CVM in the case of the new Stavros Niarchos Park which is near to the centre of Athens. Through the visitors’ willingness to pay in order to visit the park their satisfaction level is expressed and in addition, the value that people attribute to this environmental good. For this purpose, an empirical study was conducted and its results are analysed below.

This article has got the following structure: In the second part are presented the methodological issues and the data that were used in empirical analysis, while a reference is made to the under consideration urban Stavros Niarchos park. In the third part, the empirical results are presented, while in the fourth part the conclusions of the analysis are summarized.

2. Methodological issues and data

2.1 Stavros Niarchos Park

Stavros Niarchos Park is housed in Stavros Niarchos Foundation Cultural Center (SNFCC) in Kallithea, Attica. The SNFCC, a total of 210 hectares, also includes the installations of Greek National opera and Greek National Library [18,19].

Stavros Niarchos Park occupies the 85 per cent of the total area of SNFCC and it is made up of an abundance of plant species. The visitors meet colour combinations of plants which are based on the season. The way in which the park has been built and it operates fully fits into sustainability. The playground is made of wood which comes from sustainable forestry, while apart from the plants and trees, there is also and a vegetable garden which is intended both in the cultivation of organic vegetables and the education of visitors. As a result, the park is a source of oxygen in the city and it significantly contributes to the reduction of carbon dioxide emissions.

The park’s contribution to energy saving is also important. The roof is about 100 x 100 metres and is located above the Greek National opera. It is covered by solar collectors which ensure the solar needs of SNFCC. Exceptions are the periods of hosting events where energy needs are increased.

It should not be omitted the sustainable management of the park’s water resources. The irrigation of the green spaces and the implementation of systems for non-drinking water but also and the water which is used in the canal, it contributes to save the water resources needed in the park. Remarkable is the fact that the water which is used in the canal is seawater and it contributes to flood protection.

The SNFCC, which is a “treasure” for Attica, was created with an exclusive donation of Stavros Niarchos Foundation. Its function gradually started in August 2016, while it was delivered to the Greek State after its completion, in February 2017. Since then, it is a public space which is supervised by the Ministry of Finance. The visitors of SNFCC, who in 2018 reached 5,300,000 in population, have the possibility to enjoy plenty of free-entry events and activities.

2.2 Methodology

The present research applies the contingent valuation method for the case of Stavros Niarchos park. This method evaluates visitors’ willingness to enter into the park, paying an entry ticket. It is worth noting that it is a hypothetical scenario which aims to value the value of an environmental good that in this case is this specific urban park, expressed in money units.

The economic value of a specific and existing urban park with aim its use or its conservation by applying the contingent valuation method has not been researched in Greece. So, it has been chosen the Stavros Niarchos urban park because of its vicinity in the centre of Athens, the multiple services
and activities that offer but also the plethora of visitors which gathers. The sample consisted of 384 individuals and the research was conducted from July 2018 to February 2019.

2.3 Data

The empirical results are based on the estimation of the following logistic regression equation for the visitors’ willingness to pay an entry ticket in order to visit and use the park:

$$\text{Entrance fee}_i = b_0 + b_1 \text{Age}_i + b_2 \text{Age}^2_i + b_3 \text{Gender}_i + b_4 \text{Educ}_i + b_5 \text{Emp}_i + b_6 \text{Marst}_i + b_7 \text{Members}_i + b_8 \text{Expenses}_i + b_9 \text{Futurevisit}_i + b_{10} \text{Importance}_i + b_{11} \text{Nature}_i + b_{12} \text{Pastfee}_i + b_{13} \text{Satisfied}_i + u_i$$

(1)

Where:

- Entrance fee: The consumer i is willing to pay an entrance ticket to visit and use the park or not, supposing that because of the economic crisis money is needed for the conservation of the park (YES=1, NO=0); Age: a quantitative variable which indicates the age of the person; Agei2: is the square of the age of the person; Gender: a dummy variable which states the gender of the questioned person receiving the price 1 if the questioned is a man and the price 0 if the questioned is a woman; Educ: a dummy variable which states the educational level of the person and it corresponds to 1 for graduates and 0 for others; Emp: is a dummy variable which states the profession of the questioned receiving the price 1 for a private employee and the price 0 for other; Marst: is a dummy variable which states the person’s marital status and it corresponds to 1 for unmarried and 0 for other; Members: is a quantitative variable which states the number of members of someone’s household; Expenses: is a quantitative variable which states the visitor’s expenses for the visit and the use of the park; Futurevisit: is a variable which states how possible it is for someone to visit the park again in the future, receiving the price 0 if the answer is not at all, 1 for a little bit, 2 for quite possible, 3 for very likely and 4 for absolutely likely; Importance: is a variable which states how important someone believes that is the existence of parks and green spaces in the city, corresponding to 0 for not at all, 1 for a little bit, 2 for quite, 3 for very and 4 for absolutely important; Nature: is a variable which states the number for which someone visits the park in order to come close to nature, receiving the price 0 for not at all, 1 for a little bit, 2 for quite, 3 for very much and 4 for very very much; Pastfee: is a dummy variable which states if someone has paid entry ticket to visit parks and green spaces in the past, corresponding to 1 if the answer is yes and 0 if the answer is no; Satisfied: is a variable which states the number of satisfaction of the questioned from his/her visit in the park receiving the price 0 for not at all, 1 for a little bit, 2 for quite, 3 for very and 4 for absolutely satisfied; u is an error term.

The empirical results from the equation (1) are presented to the next chapter.

3. Results and discussions

3.1 Logistic Regression analysis

The conclusions that have emerged from the empirical analysis of the equation (1) agree in general with previous studies. Table 1 presents the empirical results of the estimated factors from the logistic regression equation with regard to the willingness of people to pay a hypothetical entry ticket to visit and use Stavros Niarchos Park, supposing that because of the economic crisis, money is needed for the park’s conservation. The age is an important prognostic factor for the willingness of payment an entry ticket at 5% significant level. The coefficient of “age” is 0,171 and the relative risk is 0,843. The result is that older people are less possible to accept to pay a ticket for using the park. Further, the results show that the corresponding relative risk for the education level is 1,591 and this variable affects statistically important people’s responds. Graduates are more possible to be willing to pay in order to visit the park. In particular, the corresponding percentage change is 0,591.
From the demographic characteristics of respondents, the employment also affects statistically important people’s decision to pay or not in order to visit the park which is examined. The odds increase with the private employees in comparison with others, have more possibilities for the willingness of payment by 71.5 % ceteris paribus. This specific variable is statistically important at 5% level and the corresponding relative risk is equal with 1,715. In addition, the number of members of a household affects the answers of interviewees in a positive way. As larger is the number of members of a household as more possible is someone to accept to pay an entry ticket for the urban park. People’s expense for the use of the park is one more important prognostic factor at 1% statistical significance and relative risk 1,157. As more expenses, a visitor of the park makes, as more possible is to accept the payment of an entrance ticket. This result may be related to a person’s income which has found to be an important factor in previous empirical studies.

The number in which is important for someone the existence of parks and green areas in the city was found to affect statistically important the respondents’ answers at 5% level. As more important someone believes is the existence of parks in the city, as more possible is to pay for the visit and the use of the park with 1,493 relative risks.

It was found that the number for which someone visits the park in order to come close to nature affects the possibility to pay an entry ticket in a positive way. The odds for this specific variable are equal with 1,308 and the statistical significance level 1%. Moreover, the number in which a person is likely to visit the park again in the future affects in a negative way the willingness of payment. This means that people who state more possibilities to visit the park again in future, it is less possible to accept to pay for the use of the park and the corresponding odds ratio is 0,688.

Last but not least is the payment of an entry ticket for the use of a park in the past. In contrast with previous studies in urban parks, the analysis showed that the people who have paid entry tickets in the past during their visit in a park, have more possibilities to accept to pay for the urban park which is examined, in comparison to those who have not a corresponding experience. For this variable, 2,501 are odds and 1% the level of statistical importance.

The Nagelkerke R square consists of a measure of predictability of the proposed model and is equal with 0,209. The log likelihood statistic rejects the null hypothesis and concludes that at least one of the estimated coefficients differs from zero, due to its high value. Finally, the high p-value of Hosmer and Lemeshow goodness of fit which is equal with 0,809 implies that our model fits the data well.

The application of Contingent Valuation Method (CVM) for the case of the urban park which has been studied is based on a hypothetical scenario. The willingness of people to pay an entrance ticket and the answers that the participants gave in the research may present a differentiation in a real situation. In other words, the stated preferences of people in the context of a hypothetical scenario which is presented, it may differ in practice in case that an entrance ticket is imposed to a public park, like Stavros Niarchos park.

**Table 1.** Estimated binary logistic regression of consumer willingness to pay an entry ticket in order to visit and use the park, supposing that because of the economic crisis money is needed for the conservation of the park

| Independent variables | Model I       | Model II      | Odds ratio |
|-----------------------|---------------|---------------|------------|
| **Constant**          | -0,179 (-0,10)| 0,846 (0,65) | -          |
| **Age**               | -0,143* (-1,92)| -0,171** (-2,54)| 0,843     |
4. Conclusions

The purpose of this study was to estimate the value that visitors attribute to an urban park, expressed through their willingness to pay a hypothetical entry ticket. The results of the analysis showed that the age of the person, the educational level, the employment and the number of the members in a household affect the possibility for someone to accept or not to pay a hypothetical entry ticket in order to visit the Stavros Niarchos park. Important prognostic factors were found to be the possibility for someone to visit the park again in the future, the expenses of people when they visit the park but also the possible payment of an entrance ticket for visiting an urban park in the past. Of course, it should not be omitted the importance that people give in parks and green spaces in the city, but also their motivation to visit them in order to come close to nature.

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References

[1] C. Yu, and W.N. Hien, “Thermal benefits of city parks,” Energy Bult., vol. 38, pp 105-120, 2006.
[2] A. Chiesura, “The role of urban parks for the sustainable city”, Landsc. Urban Plan., vol. 68, pp. 129-138, 2004.
[3] D.A. Cohen, T.L. McKenzie, A. Sehgal, S. Williamson, D. Golinelli, and N. Lurie, “Contribution of public parks to physical activity”, Am. J. Public Health, vol. 97(3), pp. 509-514, 2007.
[4] X. Song, X. Lv, and C. Li, “Willingness and motivation of residents to pay for conservation of urban green spaces in Jinan, China”, Acta Ecol. Sin., vol. 35, pp. 89-94, 2015.
[5] W.Y. Chen, and C.Y. Jim, “Contingent valuation of ecotourism development in country parks in the urban shadow”, INT J SUST DEV WORLD, vol. 19(1), pp. 44-53, 2012.
[6] M.B. Forleo, N. Gagliardi, and L. Romagnoli, “Determinants of willingness to pay for an urban green area: A contingent valuation survey of college students”, International Journal of
Management, Knowledge and Learning, vol. 4(1), pp. 7-25, 2015.

[7] D. Latinopoulos, Z. Mallios, and P. Latinopoulos, “Valuing the benefits of an urban park project: A contingent valuation study in Thessaloniki, Greece”, Land Use Policy, vol. 55, pp. 130-141, 2016.

[8] S.U. Ahmed, and K. Gotoh, “Estimation of the willingness to pay for preserving public parks in Nagasaki city by using contingent valuation method”, NAOSITE, vol. 37(68), pp. 53-60, 2007.

[9] A. Fardanesh, and Y. Zeraatkish, “An investigation on the promenade value of Javanmardan park in Tehran, using contingent valuation method (CVM)”, International Business Management, vol.10(9), pp. 1639-1641, 2016.

[10] H. Khan, F. Ali, H. Khan, M. Shah, and S. Shoukat, “Estimating willingness to pay for recreational services of two public parks in Peshawar, Pakistan”, Environmental Economics, vol. 5(1), pp. 21-26, 2014.

[11] A. Xifilidou, D. Vagiona, and N. Karanikolas, “Estimating the willingness to pay of Thessaloniki’s residents for the increase of the green spaces and exploring its effects to the real estate values”, Fresenius Environ Bull, vol. 23(11), pp. 2750-2754, 2014.

[12] C.R.M. Da Silva, D.S.V.R Lima, I.F. Farias, L.V.C. oliviera, and R.E.S. Fontenele, “Are visitors willing to pay for a green park; A study in a Brazilian ecological park”, XIX Engema, pp. 1-16, 2017.

[13] Z.o. Membrebe, A.J.G. Santos, J.C.C. Valeroso, and A.A. Ancheta, “Urban forest park as eco-space for liveable city: Arroceros forest park, Manila, Philippines”, International Journal of Real Estate Studies, vol. 11(4), pp. 23-34, 2017.

[14] S. Del Saz Salazar, and L.G. Menendez, “Estimating the non-market benefits of an urban park: Does proximity matter;” Land Use Policy, vol 24(1), pp296-305, 2007.

[15] A.M. Tameko, H.P.P. Donfouet, and F. Sikod, “The economic valuation of improved urban parks: a case study of Warda park”, JSD Journal of Sustainable Development, vol. 4(1), pp 271-280, 2011.

[16] N. Lopez-Mosquera, T. Garcia, and R. Barrena, “Economic assessment of the use and conservation of suburban parks. Two cases in Spain”, New Medit, pp. 59-69, 2014.

[17] D. Cook, K. Eiriksdottir, B. Davíøsdottir, and D.M. Kristofersso, “The contingent valuation study of Heiømork, Iceland-Willingness to pay for its preservation”, J Environ Manage., Vol. 209, pp. 126-138, 2018.

[18] F. Kalfa, and N. Kalogirou, “Quality through sustainable practices during the design and construction phase- the case of SNFCC”, Procedia Envrion. Sci., vol. 38, pp. 781-788, 2017.

[19] Stavros Niarchos Foundation Cultural Center, [Online] 2019 Available at: https://www.snfcc.org/.