Journal of Cultural Economics **27:** 241–257, 2003.

Contingent Valuation and Semiparametric Methods: A Case Study of the National Museum of Sculpture in Valladolid, Spain

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Abstract. Research on cultural economics is very interested in the economic valuation of *non-market goods*, particularly in the field of cultural heritage where contingent valuation techniques are currently being used with both parametric and non-parametric statistical methods to estimate the willingness to pay for cultural goods. In the literature analysed, the number of studies using semiparametric methods, however, is very limited. Our analysis is intended to help fill this gap by offering a parametric, non-parametric and semiparametric economic valuation of the National Museum of Sculpture (*Museo Nacional de Escultura*), located in Valladolid, Spain. In addition, we also gain insight on a controversial issue affecting most European museums, particularly those located in Latin countries: the role voluntary donations might play in the funding of public museums.

Key words: contingent valuation, museum economics, non-parametric and semiparametric methods, willingness to pay

1. Introduction

Within the broad range of cultural economics, one of the areas generating considerable attention, both theoretical and applied, is that of the valuation of cultural goods in general, and especially those belonging to the field of cultural heritage.[1] This paper presents an economic valuation of a prototypical cultural heritage good, a museum, by estimating the public's willingness to pay (WTP) for both direct and passive use value.[2] For the purpose of this research, a museum is understood as a bounded cultural element in which visitors can be reliably counted. This is unlike the situation for historic sites and other cultural attraction buildings where it is difficult to check the number of visitors and, therefore, to assess the public's interest in the direct use of the place. Museums are not only custodians of the cultural heritage, they also constitute a cultural product in themselves, because the manner in which they make their works available can also be considered, in certain cases, as a specific cultural creation capable of attracting visitors.

The good chosen for this research is the National Museum of Sculpture of Valladolid, Spain. The main reasons for this choice were the following: first, it is a

museum with national status[3] located in a medium capital according to the Spanish urban system; second, the cultural value of the museum both in terms of the collection and the place in which it is located make it of interest;[4] and finally, this museum constitutes an important cultural element within the cultural and tourist development of Valladolid as well as a symbol of identity for its citizens. Another strategic reason, which encouraged us to select this museum, was that the museum was about to be shut down temporarily for repairs. We therefore had the opportunity to offer the public a change in the "quantity of the good" or in the funding of the local cultural heritage as well as a plausible hypothesis of a possible change in the financing of the museum, an issue which could be useful when defining the scenarios for the contingent valuation in this study.

This paper is divided into three parts: the first concerns the methodology, the second the empirical application to the object of study, and the third the analysis of the results. The economic valuation technique used is contingent valuation, but it is different from similar works in which the type of question was open-ended question (Bille Hansen, 1997), payment card (Chambers et al., 1998), multiple choice (Martin, 1994) or single-bounded dichotomous choice (Santagata and Signorello, 2000; Bravi et al., 2002; Thompson et al., 2002). We have employed the double-bounded dichotomous choice format with a final open-ended question,[5] applied through three types of methods – parametric, non-parametric and semiparametric – which are tested together in the valuation of the public's WTP.

The study provides an opportunity to carry out a simultaneous comparison of these three results as well as a validation of some non-parametric and semiparametric algorithms in the study of the economic value of cultural heritage, particularly those of An and Ayala (1996) and An (2000) respectively. The results obtained allow a comparison of direct and passive use value and help to advance the discussion as to whether voluntary subscriptions might play a more important role as an additional source of financing for public museums, particularly in Latin countries.

2. Methodology

Cultural heritage goods are mostly quasi-public goods as they fulfil the generic characteristics of *no rivalry* and *no exclusiveness*. This means that their optimum provision in a market economy is difficult. Added to this is the peculiarity of the cultural heritage as a intangible good, associated with its aesthetic or symbolic value or its collective representation, attributes which create a series of positive external effects that can hardly be commercialised.[6] In short, goods included in the cultural heritage are often *non-market goods*, in the sense that there is no well defined process of buying and selling in which consumers plainly show their preferences and in which the price clearly reveals the level of cost and desirability of the item.

Valuation of this type therefore requires specific techniques in which all these features are taken into account. In this paper economic value is estimated using the

concept of willingness to pay, which represents the amount of money a consumer would pay to increase his level of welfare or avoid the loss of it in relation to the consumption of cultural heritage. WTP can be obtained by using various methods such as travel cost,[7] hedonic pricing, contingent valuation, etc. In this research, contingent valuation is used since it offers advantages for evaluating direct and passive use value of cultural heritage.[8]

Contingent valuation creates a hypothetical – contingent – market and obtains, through a survey, the maximum WTP in monetary terms that a respondent would award to the good being valued or to a change in the quality or quantity of it, where supply is represented by the person who interviews and demand by the person being interviewed. In a contingent valuation survey, after being provided with specific information on the aim of the study and the situation to be valued, the respondent is asked about his/her WTP with respect to the good under consideration.[9]

WTP is a value that depends on a good's observable and unobservable characteristics. Thus, from the statistical point of view, it is a random variable and, therefore, we can use parametric, non-parametric and/or semiparametric methods to estimate it. In this paper, we shall make a practical application with all three methods to obtain an economic valuation of the National Museum of Sculpture of the city of Valladolid.

In the study of contingent valuation using the double-bounded dichotomous choice format, there are four possible answers when formulating the two valuation questions (No – No, No – Yes, Yes – No, Yes – Yes) which divide the monetary interval $[0, \infty)$ into four smaller intervals ($[0, O_l)$, $[O_l, O_i)$, $[O_i, O_h)$, $[O_h, \infty)$). As a result, the only information finally available to us is that the real WTP falls within one of them because they are grouped into intervals.

In this way, let $\{X_1, X_2, \ldots, X_N\}$ be a random sample of an absolutely continuous distribution function $F(x)$ defined over the interval $[0, \infty)$, like that of the WTP variable for a public good. In studies of contingent valuation in which the double-bounded dichotomous choice format is used, the available information leads us to the conclusion that for each individual n, there's an interval $A_n = [a_n, b_n)$, such that $X_n \in A_n$. Then the log likelihood function in terms of a survival function is:

$$l(S) = \sum_{n=1}^{N} \log P(A_n) = \sum_{n=1}^{N} \log[S(a_n) - S(b_n)].$$

It can be observed that the log likelihood function only depends on S through its values at the cut-off points, which define all the intervals A_n. To explore beyond this point, let $0 = t_0 < t_1 < \ldots < t_W < t_{W+1} = \infty$ be the ordered permutation of all the cut-off points, which represents the group of W different bids considered in each study. These t_k form a partition of the distribution support $[0, \infty)$, into $W + 1$ smaller basic intervals of the form $[t_{k-1}, t_k)$. Hence, for each respondent n in the sample, there exist two integers i_n and j_n with $0 \leq i_n < j_n \leq W + 1$ such that the WTP of the individual n falls in the interval $[t_{i_n}, t_{j_n})$. For each respondent

we observe a series of features such as age, income, level of education, sex, etc., and we group them in a vector denoted as x_n. We can therefore summarise the information obtained as:

$$\{(i_n, j_n, x_n) \qquad \text{with } n = 1, 2, \ldots, N\}.$$

In this research, the number of bids used to obtain the WTP is $W = 9$, grouped in seven different survey models and defined based on the different first bids. Once the initial situation and the type of information available has been stated, we move on to briefly describe the estimations used in this investigation, first using the non-parametric algorithm of An and Ayala, and then the semiparametric algorithm of An, which is at the same time based on a parametric model, for which an estimation of the WTP will also be made assuming that the model follows a Weibull distribution.

The An–Ayala non-parametric algorithm is based on a system of self-consistency equations, which are derived from the first-order necessary conditions that characterise the maximisation of the non-parametric log likelihood.[10] At each iteration, the current estimates are used to convert arbitrarily grouped data into regularly interval-censored data (the E-step), and then the Kaplan–Meier estimator is applied to obtain a new round of estimates (the M-step).

Using the previous notation, for each individual n let i_n and j_n be values so that $a_n = t_{i_n}$ and $b_n = t_{j_n}$. Then, for $i_n, j_n = 0, 1, 2, \ldots, W + 1$ and $i_n < j_n$, let

$$\gamma_{ij} = \sum_{n=1}^{N} 1_{(i_n = i,\, j_n = j)}$$

denote the number of observations grouped into interval $[t_i, t_j)$.

Under these conditions, An–Ayala's self-consistent algorithm iterates the following two steps until convergence is reached:

1. *E-step:* Let $1 = \hat{S}_0^0 \geq \hat{S}_1^0 \geq \cdots \geq \hat{S}_W^0 \geq \hat{S}_{W+1}^0 = 0$ be the current set of estimates. For all $k = 1, \ldots, W+1$, calculate the number of "deaths" between t_{k-1} and t_k:

$$\delta_k^0 = \sum_{r=0}^{k-1} \sum_{s=k}^{W+1} \gamma_{rs} \frac{\hat{S}_{k-1}^0 - \hat{S}_k^0}{\hat{S}_r^0 - \hat{S}_s^0}$$

and the number of "at risk" at t_{k-1}:

$$n_k^0 = \sum_{s=k}^{W+1} \delta_s^0,$$

2. *M-step:* Apply the Kaplan–Meier estimator to the data $(\delta_1^0, \delta_2^0, \ldots, \delta_W^0)$ to obtain a new round of estimates, that is,

$$\begin{cases} \hat{S}_0^1 = 1 \\ \hat{S}_k^1 = \left[1 - \dfrac{\delta_k^0}{n_k^0}\right] \hat{S}_{k-1}^1, \qquad k = 1, 2, \ldots, W \\ \hat{S}_{W+1}^1 = 0. \end{cases}$$

When convergence is reached, the survivor function obtained expresses, in our case, the individual willingness to pay for the object of cultural heritage being analysed, which is assimilable to the individual demand function and is used as a base to obtain the consumer's surplus and then the economic value assigned to the cultural heritage.[11]

In the parametric and semiparametric estimates we consider that WTP (Y) is a random variable that depends on a function f of some observed characteristics (X) and others unobserved (ε). Let us suppose that this dependence can be presented through a *linear index*, $t = X\beta + \varepsilon$, with β a vector of regression coefficients, and a *link function* $\phi : R \to R^+$, so that

$$Y = f(X, \varepsilon) = \phi(t) = \phi(X\beta + \varepsilon).$$

In this model, the conditional distribution of WTP given X is completely determined by the link function ϕ together with the distribution F of ε. In contingent valuation studies, several parametric models are used. In the practical application that will be carried out later, we will use as the link function $\phi(t) = \exp(-t/\alpha)$ and the distribution of ε will be extreme value type I, that is to say, $F(\varepsilon) = \exp(-\exp(-\varepsilon))$, leading us to a Weibull distribution for the conditional distribution of Y given X.

The An semiparametric model[12] is defined by a generalisation of the previous Weibull model by relaxing the link function while keeping the distributionnal assumption on F. For the Weibull distribution, the link function $Y = \phi(t) = \exp(-t/\alpha)$ can also be written as $Y^\alpha = \exp(-t)$. In the semiparametric case the function Y^α is replaced with a generic function Λ differentiable, verifying that $\Lambda(0) = 0$ and, assuming that there exists an M such that $P(Y \leq M) = 1$, $\lim_{y \to M} \Lambda(y) = \infty$, so that $\Lambda(Y) = \exp(-t) = \exp\{-(X\beta + \varepsilon)\}$. Under these conditions, it is verified that:

$$S(y|x; \beta, \Lambda) = P(Y > y|X = x) = \exp(-\Lambda(y)e^{x\beta}).$$

The contribution to the likelihood of an observation (i_n, j_n, x_n) is the probability that $Y \in [t_{i_n}, t_{j_n})$ conditional on $X = x_n$:

$$P(i_n, j_n|x_n) = S(t_{i_n}|x_n; \beta, \Lambda) - S(t_{j_n}|x_n; \beta, \Lambda).$$

We define $\kappa_0 = \Lambda(0) = 0$, $\kappa_{W+1} = \Lambda(t_{W+1}) = \infty$, and $\kappa_j = \Lambda(t_j)$ for $j = 1, 2, \ldots, W$. Then the sample log likelihood function is simply

$$l(\beta, \kappa_1, \kappa_2, \ldots, \kappa_W) = \sum_{n=1}^{N} \log(\exp\{-\kappa_{i_n} e^{x_n\beta}\} - \exp\{-\kappa_{j_n} e^{x_n\beta}\}).$$

Due to the data grouping, the log likelihood function depends on the function Λ only through the W discrete values κ_j, $j = 1, 2, \ldots, W$. The maximum likelihood estimator for the extended parameters vector $(\beta', \kappa_1, \ldots, \kappa_W)'$ maximizes the sample log likelihood subject to

$$0 \leq \kappa_1 \leq \cdots \leq \kappa_W \leq \infty\,.$$

After a suitable reparameterization we obtained that the maximum likelihood estimator $\hat{\delta}_N = \arg\max l(\delta)$ is root-N consistent and asymptotically normal, and the asymptotic variance-covariance matrix of $\hat{\delta}_N$ can be consistently estimated by

$$\left[\frac{\partial l(\hat{\delta}_N)}{\partial \delta}\frac{\partial l(\hat{\delta}_N)}{\partial \delta'}\right]^{-1}.$$

After the maximum likelihood estimator has been achieved with these parametric and semiparametric algorithms, we obtain a perfect definition of the survival function of the WTP, and hence we are in the same situation as in the non-parametric estimation. That is to say we can draw an individual demand curve for the cultural heritage element.

The results of this investigation will be shown with the two most typical assumptions about mean willingness to pay: one alternative is the so-called "conservative" option that places all the probability mass on the left end of the corresponding interval; and the other is to take a linear interpolation of the survival function constituting a more "optimistic" option, assigning the WTP for each group of individuals at the middle point of each interval of bids.

3. Empirical Application of the Methodology

The estimation in monetary terms of the economic value of the National Museum of Sculpture of Valladolid was made through two different surveys: one meant to obtain the *value of direct use*, which was therefore carried out amongst visitors to the Museum; and another mainly aimed at verifying the *value of passive use*, which was carried out on a portion of potential users of the Museum. The latter study was done in the capital of Valladolid for, though it is a national museum, the economic significance of its possible collective funding as well as its level of recognition and identification by the public made it advisable to limit the inquiry to a local one.

In both surveys the valuation question used the double-bounded dichotomous choice format followed by an open-ended question since we thought it would be

the best process of obtaining the WTP. In our case, the *vehicle of payment* of the consumer was specified as a contribution to a special fund for the preservation and maintenance of the National Museum of Sculpture, which would be set up for that purpose, conceived, of course, as a hypothetical situation but plausible, at the same time, to the respondent.[13] In short, this fund would consist of money donated to pay for, say, the museum's running expenses. Our approach, then, is to consider the voluntary donations as a kind of voluntary tax adjusted to the individual's preferences and expense capacity, such as that typically used for financing public goods.[14]

The fieldwork for estimating use value began at the end of December 2000 and continued uninterrupted until May 1, 2001 when the museum was closed down for repair work. It was a self-completing survey so that visitors themselves were the ones who filled it in when they decided to collaborate. The number of surveys conducted was 1,147; 1,108 were finally considered valid. We had to eliminate surveys in which the valuation question was not answered, surveys that were abandoned before completion, and surveys filled in by minors.

As regards the estimation of the *passive use value* of the museum, this study was carried out through a telephone survey of the people of the city of Valladolid. The questionnaire was generally similar to the one used for the explicit visitors to the museum, and the data collection process lasted from March 20, 2001 to May 11 of the same year. From 4,148 telephone calls made, 2,215 were answered and a total of 1,133 decided to collaborate. Once completing the adjustments previously explained, 1,014 usable surveys were finally obtained.

The level of collaboration in the fieldwork was quite high among visitors to the museum since about 85% of the people approached were ready to participate. In the case of the telephone survey the percentage was above 50%, a quite satisfactory level for this type of research. We believe that the questions posed were well understood, and therefore the level of validity of the results obtained is very high.

4. Analysis of the Results

In this section, we estimate the economic value of *direct* and *passive use* of the National Museum of Sculpture of Valladolid. This is done by applying the nonparametric algorithm of An-Ayala and the semiparametric algorithm of An, as well as a parametric estimation assuming that the distribution of the WTP conditional on observed values is a Weibull distribution. These estimates are made based on the data from the two surveys.

As explanatory variables in the parametric and semiparametric models we use: Sex (Male = 0, Female = 1); ln age; level of education (Elementary education = 1, Secondary education = 2, Bachelor = 3, MsC/PhD = 4); and level of income (without income = 1, below 100,000 ptas. = 2, between 100,000 and 200,000 ptas. = 3, between 200,000 and 300,000 ptas. = 4, between 300,000 and 400,000 ptas. = 5, between 400,000 and 500,000 ptas. = 6, more than 500,000 ptas. = 7).

Table I. Statistics summary

Variable	Visitors		Telephone	
	Mean	Std. deviation	Mean	Std. deviation
Sex	0.4932	0.5000	0.6894	0.4627
Ln(Age)	3.5633	0.3455	3.6934	0.4196
Education	2.7830	0.7331	2.1186	0.7939
Income	3.3896	1.7134	2.1263	1.3246
First_Vis	0.4254	0.4944	–	–
Visited	–	–	0.7758	0.4171

Visitors to the museum were coded as to whether this was their first visit (1) or not (0), and for the telephone respondents whether they had visited the museum (1) or not (0). Table I shows the mean values and the standard deviations of all these variables for the final samples.

4.1. DIRECT USE VALUE: VISITORS TO THE MUSEUM

The analysis of the WTP of the visitors to the museum was made by inspecting 1,108 valid surveys. 7.94% of the people questioned (88 people) answered zero to the final open-ended question on WTP, but this group of respondents all had evident protest behaviour towards the valuation contingent scenario set. This negative attitude prompted us to eliminate them from the study. Consequently, the number of surveys decreased to 1,020. In order to be able to compare the different methods across the same sample of individuals, we also eliminated those who provided no information on some of the explanatory variables used in the model. Thus, the final count tallied 811, 54% of which assigned a positive WTP and 46% a zero WTP, though many of these had a latent willingness to pay through other means of payment such as compulsory tax contributions or other voluntary contributions set up for the same purpose.[15]

Following the scheme of estimating the WTP in three stages, we begin by applying the *non-parametric algorithm of An–Ayala* to the remaining surveys.[16] To do this it is necessary to calculate first the number of individuals within each valuation interval $[t_i, t_j)$, according to their different initial and second bids. In the same way, it is also important to determine initial values in order to obtain the survival function. In our case, a survival function has been used such that the jumps from one extreme of the interval to the other have the same amplitude (1/10).

The survival functions obtained after applying the An–Ayala algorithm are shown in Figure 1. Figure 1(a) is the "*conservative*" option and Figure 1(b) is the linear interpolation option, which can be thought at as an "*intermediate*" option.

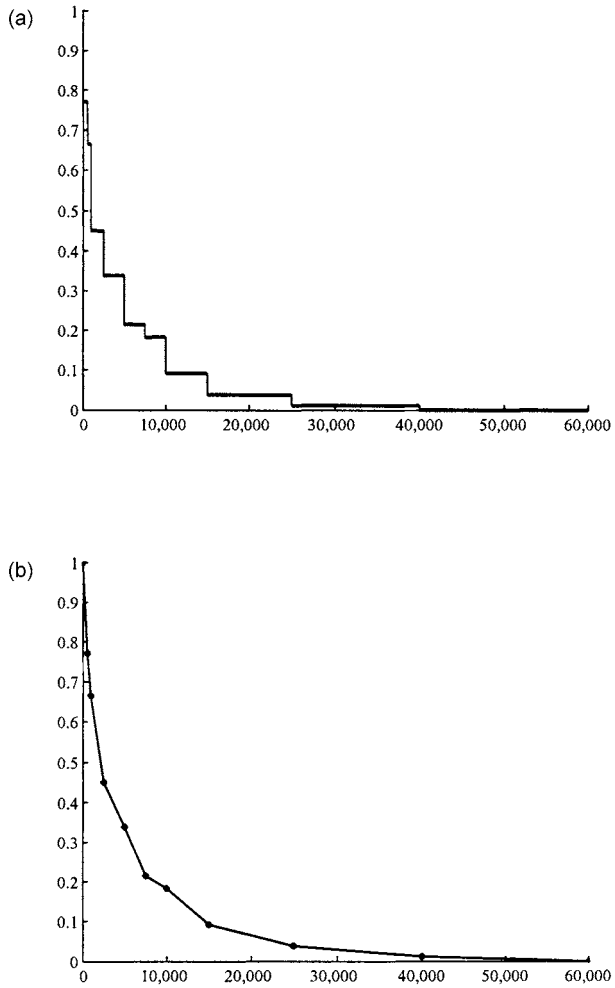

Figure 1. Empirical survival distribution for visitors: (a) conservative; (b) interpolated.

The value chosen for t_{w+1} was 60,000 pesetas as this was the maximum value assigned to the open-ended question in the survey. These functions, from the point of view of microeconomic analysis, represent demand curves for the direct users of the National Museum of Sculpture, and therefore show us its *use value*. Calculating consumer surplus as the area under the curve, the value obtained from this estimation is 4,231 pesetas (25.43 €) in the case of the conservative option; and 5,617 pesetas (33.76 €) if linear interpolation is used (the more optimistic situation). These quantities thus represent the mean willingness to pay of visitors for the preservation and maintenance of the National Museum of Sculpture.

We carry out the second and the third stages of the WTP estimation process together, that is, assuming the distribution of Y conditional on X is a Weibull distribution in the *parametric case* and applying the *semiparametric algorithm of An*.

Table II. Maximum likelihood parameter estimates for the conditional distribution of the WTP for visitors

Variable	Parameter	Param. mod.	Semip. mod.
Sex	β_1	0.0194	0.1405
		(0.0787)	(0.0850)
Ln(Age)	β_2	–1.0454	0.3561
		(0.0707)	(0.1429)
Education	β_3	–0.3138	–0.0802
		(0.0548)	(0.0613)
Incomes	β_4	0.0992	–0.0635
		(0.0265)	(0.0326)
First_Vis	β_5	–0.2215	–0.2661
		(0.0775)	(0.0821)
	α	0.5337	–
		(0.0224)	
	κ_1	–	0.1173
	κ_2	–	0.1843
	κ_3	–	0.3657
	κ_4	–	0.4987
	κ_5	–	0.7147
	κ_6	–	0.7883
	κ_7	–	1.1162
	κ_8	–	1.5615
	κ_9	–	2.1145

Note: Standard deviations in parenthesis.

Table II presents the values of the estimated coefficients for the various parameters using both methods of calculation.

Hence, we can conclude that in the parametric case, with the conservative estimation the mean WTP is 4,497 pesetas (27.03 €) and with the interpolated linear estimation the mean is 6,056 pesetas (36.40 €); in the semiparametric case, these values are 5,113 pesetas and 6,733 pesetas (30.73 € and 40.47 €) respectively.

Our conclusions are in line with previous research that also uses WTP estimates for museums. For example, Bravi et al. (2002) analyse two museums of modern art in Turin and also use parametric and non-parametric CV techniques, although we use the double-bounded dichotomous choice format whereas they use the single-bounded dichotomous choice format. In the case of parametric valuation, the mean values for the *Galleria Civica* and *Rivoli Castle* were 26.60 € and 27.79 €, similar to our 27.03 € for the National Sculpture Museum. On the other hand, with respect to non-parametric valuation, rather significant differences emerged since we obtained 25.43 € whereas they estimated 18.59 € and 18.39 € respectively. This

difference seems to emerge from the format of the survey (single-bounded versus double-bounded), since non-parametric techniques are more conservative in their estimates. Santagata and Signorello (2000) find similar estimates in their study of *Napoli Musei Aperti*. Their parametric estimate was 23.20 €, similar to our study, but their non-parametric estimates were much lower at 15.52 €, again due to the use of a single-bounded valuation question.

4.2. PASSIVE USE VALUE: PEOPLE FROM VALLADOLID

The estimate of the *non use* or *passive use value* of the National Museum of Sculpture of Valladolid is made by using data obtained from a telephone survey of inhabitants of Valladolid. The number of valid surveys was 1,014. In this case the number of respondents who answered "zero" to the open-ended question and demonstrated protest behaviour towards the scenario presented was 151, 14.89% of the respondents. These people, just as in the case of the museum visitors, were excluded. Thus, the number of surveys decreased, first, to 863, and then to 776.[17] This decision was taken in order to homogenise the sample for the different methods used and was the result of eliminating the surveys in which some of the explanatory variable questions had not been answered.

The methodology employed in this process of analysis is the same as that used to obtain the *direct use value*, that is, the non parametric algorithm of An–Ayala with the same first bids for the survival function, and the semiparametric algorithm of An with its equivalent parametric model using the Weibull distribution.

Figure 2 presents the survival functions for the conservative and intermediate options, which can be interpreted as demand curves for the National Museum of Sculpture and correspond to the *passive use value* assigned by the people from Valladolid. From these demand curves we can calculate willingness to pay for optional consumption, bequest value, and existence value of this cultural heritage good. The consumer surplus for the two cases is 4,522 pesetas (27.18 €) and 6,017 pesetas (36.16 €) respectively; these estimates are higher than, but similar to, those given by visitors to the museum (i.e., those estimates corresponding to *direct use value*).

Table III compares the parametric and semiparametric models with respect to the value of the obtained estimators and the mean willingness to pay of the telephone respondents. When we assume that the distribution is a Weibull, the values are 4,494 pesetas (27.01 €) under the conservative option and 6,106 pesetas (36.70 €) when interpolated; when we apply the semiparametric model the values are 4,369 pesetas and 5,825 pesetas (26.26 € and 35.01 €) respectively.

Few studies have reported passive use value. Martin (1994) claims that it is $ 7.95 for the *Musée de la Civilisation* in Quebec. His methodology, however, is different since WTP is estimated by means of a multiple choice question survey. Perhaps, the cost of a subscription to the Society of Friends of the National

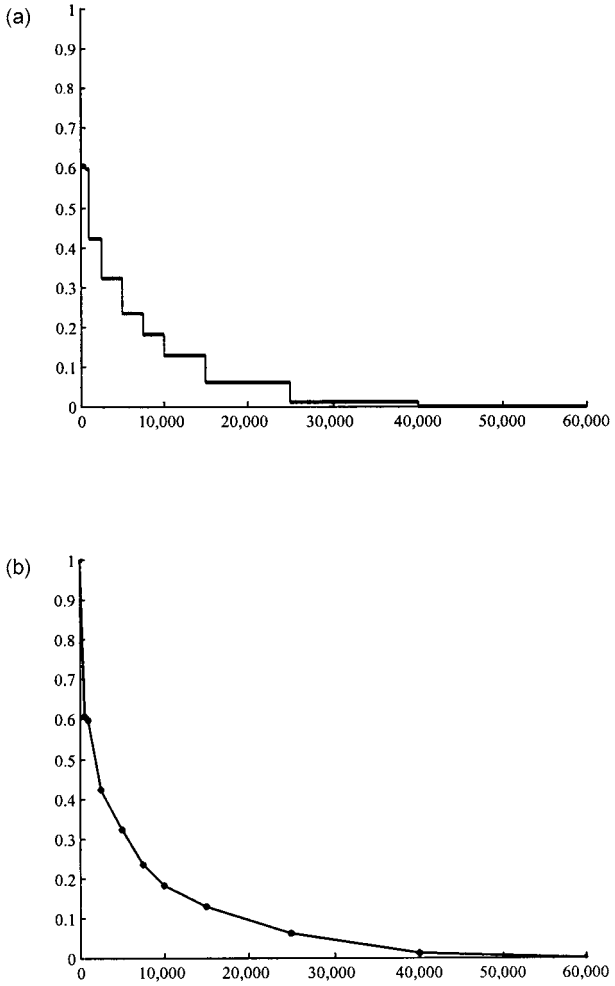

Figure 2. Empirical survival distribution for people from Valladolid: (a) conservative; (b) interpolated.

Museum is the most similar to our analysis. It is 30 €, a figure in line with our estimates.

Finally, Table IV summarizes the values obtained for the three different methods under the two different assumptions for the two studies.

5. Conclusions

In recent years, we have witnessed a change in the financing system of museums, which has turned toward greater use of the legal framework of the foundation, a more active institutional way of managing and attracting funds. This change has mainly taken place in contemporary museums, but it is also affecting more

Table III. Maximum likelihood parameter estimates for the conditional distribution of the WTP for people from Valladolid

Variable	Parameter	Param. mod.	Semip. mod.
Sex	β_1	0.0770	0.0556
		(0.0906)	(0.0980)
Ln(Age)	β_2	–0.7220	0.1642
		(0.0566)	(0.1153)
Education	β_3	–0.5031	–0.2128
		(0.0529)	(0.0640)
Income	β_4	0.0240	–0.0490
		(0.0332)	(0.0374)
Visited	β_5	–0.0833	–0.0553
		(0.0927)	(0.0995)
	α	0.4645	–
		(0.0200)	
	κ_1	–	0.4732
	κ_2	–	0.4853
	κ_3	–	0.8341
	κ_4	–	1.0922
	κ_5	–	1.4090
	κ_6	–	1.6604
	κ_7	–	1.9913
	κ_8	–	2.7242
	κ_9	–	4.4842

Note: Standard deviations in parenthesis.

traditional museums owned and managed by the state. They are beginning to make use of this new legal framework [18] to create complementary institutions for funding some of their activities, be it training and education, restoration and maintenance, or acquisition of new funds for the collection.

In this context, the contingent valuation method can be of great use. It serves as an estimation tool to obtain useful information on the maximum amounts that might be paid as donations, with the understanding that this valuation includes both the value assigned by the direct users of the good (*direct use value*) as well the estimated value to potential users (*passive use value*). In sum, the contingent valuation method can be a useful approach for an economic valuation of historic resources and especially of museums as culturally bounded goods.

In this study we have presented the results of an application of these techniques to the National Museum of Sculpture of Valladolid. It is a national museum located in a medium size city according to the Spanish urban system; it is a tourist attraction

Table IV. Valuation table of the National Museum of Sculpture [in pesetas and (euros), 2001]

Method	Direct use value		Passive use value	
	Conservative	Interpolated	Conservative	Interpolated
Parametric	4,497 (27.03)	6,056 (36.40)	4,494 (27.01)	6,106 (36.70)
Non-Parametric	4,231 (25.43)	5,617 (33.76)	4,522 (27.18)	6,017 (36.16)
Semiparametric	5,113 (30.73)	6,733 (40.47)	4,369 (26.26)	5,825 (35.01)

and a symbol of collective identification for the city. The estimation included both consumers with positive willingness to pay and zero bidders who suggested that they were willing to channel their latent willingness to pay through other means (taxes, donations, etc.). Only respondents who showed a protest behaviour towards the valuation scenario set were excluded.

The result of the valuation of the mean WTP of direct users of the museum (*direct use value*) was between 25 € and 30 € under a conservative scenario and between 33 € and 40 € under a more optimistic scenario; at the same time, the value assigned by potential users of the museum (*passive use values: option, bequest and existence*) was approximately 27 € and 36 € for each of these scenarios. These estimates demonstrate a considerable willingness to pay for the National Museum of Sculpture of Valladolid and also show that there is general support for such a system of donations. Moreover, there is no great difference between the valuation of the direct users and the valuation of potential users; in several cases, for example in the non-parametric model, the latter estimate is actually 2 € higher than the estimate of the value to direct users. This result must be interpreted with care taking into account biases introduced by any scenario in a hypothetical valuation and the voluntary nature of the hypothetical contributions.

This research is also useful in another way: it allows the simultaneous comparison of three valuation methods (parametric, non-parametric and semiparametric) under one double-bounded dichotomous choice survey system, whereas the usual method for this type of study has been to use a parametric valuation only. In this way, the results show that the demand function for the analysed cultural good and its expected WTP does not vary significantly no matter what econometric approach is used.

In this study we have limited ourselves to trying out different algorithms to calculate the global valuation of a museum in the form of donated fees. In addition, we have also detected a latent willingness to pay on the part of actual and potential customers, who have agreed to paying for the preservation and maintenance of cultural public goods. This seems contrary to current cultural policies, at least in Latin countries, which typically resort to public financing of cultural public goods.

Acknowledgements

Thanks are due to Dr. Fuertes Olivera and Regina Kwapong-Kumy for the English translation. Thanks are also given to Dr. De Prada Moraga and professor Jesús González Fernández for their collaboration in writing the programme for the parametric, non-parametric and semiparametric models using the Matlab framework. Thanks also to J. Mark Schuster and to two anonymous referees for their comments.

Notes

1. Noonan (2002) and Mourato and Mazzanti (2002) offer reviews of contingent valuation of cultural heritage.
2. Direct use value consists of the valuation given by the museum's direct users, whereas passive use value comprises the latent implicit value as revealed by either potential users or those who give the historical heritage some value as an identity sign or as a prestige element in a society. See Frey (2000) and Throsby (2001).
3. The museum belongs to the National Network of Museums of Spain maintained and run by the Ministry of Education and Culture.
4. The building has been declared an Artistic-Historic Monument since May 1, 1962. The collection includes the most representative examples of polychromide wooden sculpture from the Spanish Baroque.
5. Cuccia and Signorello (2000) offer a similar view, but do so while estimating an entry price and not a donation, which is what we are dealing with in this paper.
6. On the use of economic analysis to consider the cultural heritage, see Hutter and Rizzo (1997), Peacock (1998) and Herrero (2001).
7. Bedate et al. (2003) apply this methodology to four different prototypes of the Spanish cultural heritage.
8. A more detailed explanation of these issues can be found in Mitchell and Carson (1989) and Sanz (2001).
9. For a more detailed discussion of the methodology of contingent valuation consult Mitchell and Carson (1989), Arrow et al. (1993), Riera (1994) and Sanz (2001).
10. The algorithm can be found in detail in An and Ayala (1996).
11. An in-depth microeconomic analysis is found in Mitchell and Carson (1989), Chambers et al. (1998) and Sanz (2001).
12. The detailed explanation of this procedure is found in An (2000).
13. The final text of the contingent valuation scenario and the valuation question was the following:

    > In this group of questions a *completely hypothetical* situation is presented. It is aimed at obtaining useful information, from an academic point of view, on the value you assign to the National Museum of Sculpture, considering your cultural cost throughout the year. They have no future consequence. Let's assume that a special fund was set up to contribute to the preservation and maintenance of the National Museum of Sculpture. Let's also assume that the contribution to this fund was done annually. In this situation, would you be willing to contribute to such a special fund with ... pesetas for the preservation and maintenance of the museum?

14. Voluntary donations for protecting the cultural heritage are tax deducible in Spain and entitle the donor to free entrance into the museum and to similar services.
15. Hence, all the population showing an explicit or latent willingness to pay has been considered in the economic valuation.

16. This algorithm cannot be found within the usual applications of the statistics programme of the computer. As a result, a special programme had to be written in Matlab to be able to apply it.
17. Among these, 52.2% expressed a positive WTP and the rest assigned a zero WTP because they considered other contributions or other alternative forms of payment than the one presented in the survey.
18. Generally in the form of a foundation or a "Friends of" organization.

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