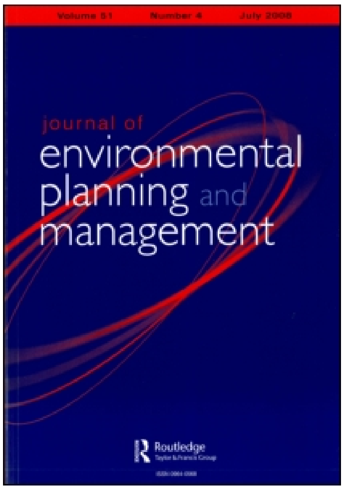

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The valuation of historical sites: a case study of Valdivia, Chile

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The economic valuation of cultural heritage is an area of increasing interest and an important research topic in the emerging field of cultural economics. Many services and values associated with cultural heritage are not traded in markets, and their estimation requires methods developed for the valuation of non-market goods, such as those used in environmental economics. This paper applies the contingent valuation method with double dichotomous choice to estimate the value of historical sites in the city of Valdivia, Chile. The valuation exercise was implemented by designing a hypothetical guided walking tour to a cluster of historical sites in the city centre, and surveying tourists visiting the city during the summer of 2004. Parametric and non-parametric statistical methods were used to estimate the survival distribution and the mean and median estimates of the willingness-to-pay (WTP). The study emphasizes the importance of explicitly treating heterogeneous preferences and the sensitivity of the survival distribution to the estimation methods used.

Keywords: cultural tourism; historical heritage; contingent valuation method; cultural economics

1. Introduction

The 'economy of culture' is gaining ground as an area offering a wealth of possibilities for theoretical reasoning and empirical testing vis-à-vis mankind's behaviour and institutions concerned with past as well as present day culture (for more in this area, see the work of Throsby 2001, Blaug 2001, Towse 2003). By this, cultural goods are understood to be not only living creations and expressions, such as modern day performing arts and plastic arts, but also everything that is regarded as cultural heritage from a historical perspective, accumulated over the years and offering a sense of inheritance. The 'economics of historical heritage' has emerged as an area of analysis in its own right, due to the singularity of the goods involved, which tend to be unique, non-reproducible and subject to sustainability over time. Moreover, many of these goods are considered public goods which provide a series of intangible values linked to their aesthetics or symbolic content, such that the market and prices are not likely to reflect their full value (for key aspects of the economics of historical heritage, see Hutter and Rizzo 1997, Herrero 2001 and Rizzo and Towse 2002).

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This does not mean that citizens do not display an underlying appreciation, shown through a desire to recover and conserve these goods. Nor does it imply that cultural heritage, understood to be a capital good, is alien to a series of expenses and jobs, mainly linked to the demands of tourism, which might contribute to the economic development of cultural heritage sites. For this reason, it is important to establish approaches and undertake empirical studies addressing the valuation of historical and cultural heritage as they might at least serve to ascertain society as well as individuals' preferences with regard to these goods.

The case study in this paper focuses on the valuation of the historical ensemble of the city of Valdivia, an enclave located in the extreme south of Chile, away from the main population centres and with a relatively small population (134,500 inhabitants). The historical heritage of Valdivia comprises a series of heterogeneous and dispersion elements, the most salient symbols of identity of which are its Spanish origin, the system of fortifications dating from the Spanish Empire, and nineteenth century German colonisation, which left a significant mark on the urban design of the city as well as its collective identity.

Valuation of this historical ensemble affords an interesting case study, both in terms of the methodological challenge it represents, due to the diverse nature of the goods analysed, their dispersion around the city, and the possibilities for using the findings in feasibility studies for tourist projects, or in the assessment of policies for recovering cultural heritage. This is particularly important in the case of Chile and other developing countries, since policies for preserving historical heritage compete with other pressing social and urban development priorities. Without tax or other financial incentives, many of these historical buildings might be left to deteriorate, either because owners lack the resources for their restoration or because the high alternative land value acts as an incentive for their conversion to other uses.

This study thus aims to provide information on the visitor demand and use value of the main elements that make up the historical heritage of central Valdivia. The approach is based on economic valuation methods applied to non-market goods, mainly those developed to value environmental resources (Freeman 2003), and more recently applied to the area of cultural heritage (Noonnan 2002). The study opted for the contingent valuation method (CVM), which has grown in popularity due to its flexibility when reflecting the particular features of the issue under consideration.

The information on preferences of national and foreign tourists was obtained through a survey conducted *in situ* at the main points of interest around the city. Following standard practice from the literature, the dichotomous choice type question or the referendum approach was used (Arrow *et al*. 1993). In order to achieve greater statistical accuracy, the study applied the double-bounded procedure analysed by Hanemann, *et al*. (1991). Following on recent studies, the heterogeneity of individual preferences is explicitly considered through a prior participation question. Following on from Haab (1999), a participation question was included prior to the valuation of the actual case study. In order to assess possible biases involved in the assumed functions involved in the parametric specification, the results are compared to those obtained using non-parametric approaches (An and Ayala 1996).

This paper is organised in six sections. Section 2 offers a brief review of the methodological challenges involved in the estimation of willingness-to-pay from double-bounded dichotomous questions. Section 3 describes the case study, data gathering and the descriptive statistics. Section 4 describes the basic parametric approach and its results. Section 5 compares the previous findings with the survivor function estimated using non-parametric methods and analyses the implications for estimating expected demand at a specific price, and finally section 6 presents the main conclusions.

2. Using contingent valuation for estimating the economic value

The issue of determining the optimal provision of public assets has become increasingly complex, in so far as health and food safety, environmental quality or architectural beauty and the recovery of cultural heritage increase in value compared to private assets or other more traditional public assets. Allocation of important resources devoted to the conservation or enhancement of such goods requires appropriate justification, implying the need to develop methodologies to quantify the demand for them and/or their value. Decision making concerning the protection and conservation of the environment is probably the area which has led to the greatest development of new methods for placing an economic value on non-market goods (see for example Bateman and Willis 1999, Haab and McConnell 2002, Freeman 2003).

The contingent valuation method (CVM) emerged as a more flexible alternative to traditional methods based on stated preferences, such as travel costs and hedonic prices, and its application has spread to various areas (Carson 2003), amongst which some recent studies on cultural heritage may be highlighted (Navrud and Ready 2002, Noonan 2002). The CVM approach based on dichotomous choice questions, introduced by Bishop and Heberlein (1979), has become the dominant strategy in the literature due to two significant advantages: (1) it is less susceptible to strategic behaviour and; (2) it is easier for respondents, thus curbing the number of non-responses or protest responses (McFadden 1994, Haab and McConnell 2002).

The advantages of dichotomous choice CVM over other more direct approaches, such as those based on open questions, are counterbalanced by greater complexity in terms of the valuation procedures that researchers need to use. Data gathered from yes/no answers do not allow the possibility of estimating directly the measure of benefit or willingness-to-pay (WTP), and relatively sophisticated statistical or econometric methods are thus required (Haab and McConnell 2002). A further and more significant stumbling block inherent in the dichotomous approach is its relatively poor efficiency due to the limited information obtained from each respondent, requiring fairly large samples in order to obtain a reasonable degree of accuracy in the estimated values. Double-bounded questioning emerged as a means to improve statistical efficiency in CVM applications, despite the possible risk of introducing biases or inconsistencies linked to previous approaches based on iterative questions (Carson *et al*. 2001).

The double-bounded approach proposed by Hanemann (1985) entails a follow-up dichotomous question with a bid which is higher or lower than the value corresponding to the first question, depending on whether the response given was yes or no, respectively. As Hanemann *et al*. (1991) showed, depending on the situation, significant gains may be made in terms of efficiency through the use of this approach, reflected in a reduction of the confidence level of the mean or median of the WTP.

However, one difficulty with this approach is that the second question may prove to be an incentive for strategic behaviour. Various studies have highlighted that WTP distribution estimated when the second question is included shifts to the left, giving rise to lower means or medians (Haab and McConnell 2002). Amongst the various interpretations posited to explain this phenomenon, it has been suggested that the respondent sees the change in value in the second question as a question linked to a variation in the quality of the asset or that the value might be negotiated (Carson *et al*. 2001). Despite possible biases inherent in the double-bounded method, its use seems to be justified owing to the fact that the mean square error is lower (Alberini 1995), or that it provides a conservative WTP estimate (Banzhaf *et al.* 2004). One variation, which may reduce the problem of strategic behaviour, considers asking a second question only when the first response is negative (Haab and McConnell 2002). This variation is based on the original proposal by Cooper *et al.* (2002), in which respondents are aware of the two possible offers prior to the choice questions, and only in cases where the response is affirmative to the lower value or negative to the higher value are they asked the second question.

The dichotomous choice CVM does not provide a direct observation of WTP, and the estimation of its distribution has traditionally been performed through parametric methods. This distribution is conditioned to a vector of covariables and it must take into account that WTP is positive for a favourable quality change (or higher availability of the asset). A distribution function defined over a range of non-negative values is typically assumed such as a log-logit, lognormal or Weibull (An 2000). In some applications, it has been found that parametric estimation imposes restrictions on the form of the distribution which proves incompatible with the data, leading to results that do not seem reasonable (Carson *et al.* 1994). Possible errors in specification linked to the poor flexibility of parametric estimation that might lead to a mean or median estimated WTP, which is not consistent from the statistical viewpoint, have spurred the development of non-parametric estimation techniques, which are free from any functional form or the distribution used (Haab and McConnell 2002). More recently, considerable interest has arisen in the development of semi-parametric techniques, aimed at achieving compatibility of flexibility in the specification with analysis causality through the inclusion of covariables (recent examples include An 2000, Álvarez and González 2003, Sanz *et al.* 2003, Araña and León 2005).

3. The study site and data

The cultural heritage of the city of Valdivia mainly comprises Spanish fortifications (towers) and houses dating back to the time of the German colonization, located principally on Teja island and in General Lagos Street. Most of these elements are currently under the protection of the National Monuments Law. A total of 55 buildings are being assessed by the Municipality of Valdivia to be officially certified as ‘Buildings and Areas for Historical Conservation’, in accordance with regulations laid down in the General Law on Town Planning and Construction. So far no studies have been undertaken to establish the economic value of these buildings vis-à-vis their contribution to tourism in the city.

The main difficulty involved in defining the area under study arises from the fact that these areas or buildings which make up the heritage assets are not confined to any single historical centre or within city walls, which tends to be the case in European cities, although they do form a homogeneous ensemble of elements which are fairly close to one another. In order to carry out the valuation exercise and overcome the spatial dispersion problem, the paper proposed a ‘guided walking tour’, with the assets to be valued clearly defined in as real a scenario as possible (for a similar methodological approach, see Santagata and Signorello 2000).

In the survey questionnaire, the tour was named ‘Historical heritage of central Valdivia’ covering the city’s main cultural and heritage landmarks in a 90-minute walk (see Figure 1).

The study population comprised tourists over the age of 18 who visited the city in the summer of 2004. The sampling size was determined for an error of 4% with a 95% confidence level. A 615 sample of national and foreign visitors were randomly selected

Figure 1. Layout of the proposed tour.

under proportional stratification. The fieldwork was undertaken between the final week of December (2003) and the first week of March (2004). Interviews were conducted in an area highly frequented by visitors, near to the waterfront (Schuster wharf and riverside market), and in the city's tourist information office, located in the same sector.

The questionnaire was divided into three sections, the first of which dealt with the activities the respondents had engaged in during their visit. The second section focused on the monetary valuation of the subject matter, by stating the contingent valuation question for those revealing interest in participating in the activity proposed. The specific question posed was as follows:

> You have the chance to go on a guided tour on foot [show photos and map]. If you wish to take part in this activity you need to purchase a ticket which will give you the right to a tour guide as well as admission to the Historical Anthropological Museum. In addition to paying for the services of the guide, the money collected would be used to conserve, maintain and restore the historical heritage visited. In this situation and bearing in mind that these resources will no longer be available to you for other personal use, would you be prepared to pay _____ for the ticket?

The last section of the interview was aimed at gathering information on the socio-economic characteristics of the respondents, including sex, age, academic qualifications, income, etc.

A vector of eight bidding values was randomly allocated to each respondent, chosen in accordance to the empirical distribution of open question responses obtained in the pre-survey exercise. These bid values were subsequently adjusted using the data gathered from the pilot survey. Table 1 shows the prices of the ticket in Chilean pesos allocated to the individuals in the sample, which were then converted into Euros or dollars depending on the tourists' residence.

If the individual's response to the first price was affirmative, he or she was presented with a higher price as shown in the second row. Otherwise, they were presented with a lower price, as shown in the third row. These vectors were selected such that the probability of responding affirmatively to the maximum price offered was close to 0, while the probability of responding affirmatively to the minimum price was close to 1. In order to differentiate valid responses from those considered as 'protest', respondents were asked to give the reason for their responses.

Table 2 shows descriptive statistics of respondent characteristics. Most respondents were male and the mean age was 38. Foreigners corresponded to 22.1%, mainly from Europe and 79% of those interviewed had a university education. This latter figure is significantly larger than the one for the country population of 16%. A high percentage of those interviewed (28.9%) were staying with relatives or friends. Average daily expenditure was 14,200 Chilean pesos (€18.93) and the average stay was four days, a figure slightly above the average for national tourists. Average visitor income for those who volunteered this information was 659,000 Chilean pesos (€878.7).

Table 1. Price vectors used in the double-bounded questions (Chilean pesos)[a].

First price	2000	3000	4200	5700	7500	9500	12,000	15,000
Second price/Yes to the first price	2500	3500	5000	6500	8500	10,500	13,500	20,000
Second price/No to the first price	1500	2500	3500	5000	6500	8500	10,500	13,500

[a]€1 approximately = 750 Chilean pesos; US$1 approximately = 600 Chilean pesos).
Source: Authors' own elaboration.

Table 2. Descriptive statistics of socio-economic variables.

Variable	Category	Percentage/average
Sex	Female	46.5%
	Male	53.5%
Education	Non-university	21.0%
	University	79.0%
Accommodation	Relatives' or friends' house	28.9%
	Hotel/Apart-hotel/boarding house	41.4%
	Rented house/cabin	20.8%
	Camp-site/other	8.9%
Stay	Days	4
Age	Years	38
Income	Thousands of pesos (approx)	659
Daily expenditure	Thousands of pesos	14.2
Origin	National	77.9%
	Foreign	22.1%
Interest in taking part in the tour	Yes	78.9%
	No	21.1%

Source: Authors' own elaboration.

Different participation decisions resulting from heterogeneity of preferences has consequences for WTP estimation, as found recently (Araña and León 2005). In the valuation of historical heritage, diversity of preferences is likely to be at least as important as for environmental goods, meaning that certain individuals may be indifferent to historical heritage assets, or might even display a negative WTP towards certain goods. The study here follows the recommendation of Haab and McConnell (2002), by explicitly addressing this problem through the inclusion of a participation question, prior to the contingent valuation question, in order to identify individuals not willing to participate at any price.

A probit model is estimated to explain the probability of participation. The results, shown in Table 3, indicate that parameters of the residence variable (with 1 for foreigners and 0 for nationals) and visitors who stayed with relatives or friends variable (with 1 for family or friends hosts and 0 for other accommodation) are statistically significant at 5% or higher. The signs of these coefficients indicate that, when there is control by the remaining covariables, the likelihood of foreigners participating is greater than nationals and lower for visitors staying with relatives or friends. This latter result can be explained by the nature of the experiment and the possibility that these respondents might have visited these places accompanied by relatives and friends. More surprising is the non-significant impact of income, academic qualifications or membership of a cultural centre. The zero or even negative impact of income might be due to the growing number of leisure options available to those with higher incomes over a limited time of the visit. The nature of the experiment itself might also affect the result of the variables related to academic qualifications and membership of a cultural centre. In short, however, it may be concluded that individuals most likely to participate in the activity proposed are those who are tourists in the strictest sense. The nature of the experiment posed could also affect contingent valuation responses and the unexpected effect of education and membership of a cultural club.

4. Parametric estimation of WTP

This paper adopts the parametric approach developed by Cameron and James (1987), subsequently extended for the double-bounded format by Hanemann *et al.* (1991) and Cameron and Quiggin (1994). In the more general specification, WTP is determined by the following expression:

$$WTP_{ij} = \mu_i + \varepsilon_{ij} \qquad (1)$$

Table 3. Explaining activity participation using a probit model.

Variable	Coefficient (1)
Constant	0.8294 (2.915)**
Income	−0.1694 (−1.067)
Origin	0.6346 (3.854)**
Membership of a cultural centre	0.1349 (0.53)
Age	−0.0085 (−1.904)
University dichotomy	0.1541 (1.132)
Staying at relatives' or friends' house	−0.3326 (−2.577)*

Notes: t statistic in parentheses.
**p-value = 0.01; *p-value = 0.05
Source: Authors' own elaboration.

where WTP_{ij} represents the individual's willingness-to-pay j and $i = 1,2$ represent the first and second question. In this specification, the WTP values can differ between the two questions, due to the differences in means (μ_i) or error (ε_{ij}).

A general specification of this problem adopts a normal bivariate distribution $NBD(\mu_1,\mu_2,\sigma_1,\sigma_2,\rho)$ for the errors linked to both questions, yielding a bivariate probit model (Cameron and Quiggin 1994). This model can be estimated by the maximum likelihood method, using routines available in computational programmes such as SAS or LIMDEP. Under this general specification, WTP estimators may be different depending on whether or not the parameters from the first or the second question are used. One particular situation arises when the parameters of both functions are assumed to be equal ($\mu_1 = \mu_2$), although the error terms are differentiated as a result of random shocks specific to each response (Alberini *et al.* 1997). This specification leads to the random effects model, which takes into account the specific effects associated with individual preferences, which are carried from one question to the other. This model has been developed in the analysis of panel data and the estimation routines are also available in the previously mentioned programmes.

Full efficiency is reached, in the particular case considered by Hanemann *et al.* (1991), when the means and errors between both questions are equal, which corresponds to the interval data model. Table 4 shows the contributions to the likelihood function (the probability of observing a combination of responses y_{1j} and y_{2j}) for the bivariate probit and the interval data models. The interval data model is a particular case of the bivariate model when $\mu_1 = \mu_2$, $\sigma_1 = \sigma_2$ and $\rho = 1$, equivalent to the random variables representing WTP being identical between both questions; in other words $WTP_{1j} = WTP_{2j}$. Estimation of this model may be performed using a general purpose statistical package, such as GAUSS, SAS or LIMDEP allowing for numerical optimisation of a function.

Bearing in mind that the model only includes individuals who display a willingness to participate, the WTP distribution range does not contain negative values. One way to allow for this restriction in the parametric specification here is to adopt a lognormal distribution, which is equivalent to applying the natural logarithm to the bid variables for both questions, as reflected in Table 5 (Cameron and Quiggin 1994). It can be seen that for the log-normal specification, the WTP mean and median are given by

$$E(WTP) = \exp\left(\mu + \frac{1}{2}\sigma^2\right) \tag{2}$$

and

$$MD(WTP) = \exp(\mu) \tag{3}$$

Table 4. Contribution to the likelihood function for the bivariate probit models and with interval data[a].

Response	Interval data	Bivariate probit
No, no	$\Phi\ (z_{2j})$	$\Phi\ (z_{1j},z_{2j},\rho)$
No, yes	$\Phi\ (z_{1j})–\ \Phi(z_{2j})$	$\Phi\ (z_{1j})–\Phi\ (z_{1j},z_{2j},z_{2j},\rho)$
Yes, no	$\Phi\ (z_{2j})–\Phi\ (z_{1j})$	$\Phi\ (z_{2j})–\Phi\ (z_{1j},z_{2j},\rho)$
Yes, yes	$1–\Phi\ (z_{2j})$	$1 + \Phi(z_{1j},z_{2j},\rho)–\Phi(z_{1j})–\Phi(z_{2j})$

[a]$z_{2j} = (\ln c_{2j} - \mu_2)/\sigma_2$ and, c_{1j} and c_{2j} are the first and second bids allocated to the individual j, respectively. $\Phi(.)$ is the normal accumulated standardised distribution and $\Phi(.,.,\rho)$ is the accumulated normal bivariate standardised distribution.

The estimated parameters for the different specifications are shown in Table 6. In accordance with results emerging from other studies, both the interval data model as well as the random effects model may be ruled out in favour of the version without constraints (bivariate probit). It can be seen that the greatest increase in the value of the likelihood function occurs when the restriction setting the correlation coefficient equal to 1 is eliminated, inherent in the interval data model.

Despite the differences observed in the parameters of the various models, the averages of the median WTP prove to be fairly similar, above all in the models with constraints, although they are lower than the general model or the single bounded model. As expected, the differences are far more significant in the case of estimation of the mean, due to the differences among the various models in the estimation of the tail of the distribution. It should be noted that the estimated values only correspond to those visitors who displayed an interest in participating in the cultural activity proposed, and the calculation of the mean values for visitors needs to be adjusted for the participation rate of 78.9%, estimated in Table 2, see section 3.

By using the Krinsky and Robb approach (Haab and McConnell 2002), it is possible to estimate the standard deviation and the confidence intervals of the median and the mean WTP (MD(WTP)) and E(WTP). The final four rows of Table 6 show the upper limits (UL) and lower limits (LL) for the various models estimated. Significant gains in terms of efficiency can be observed by including the second question in the random effects model and interval data model, which is reflected in a lower standard deviation as well as narrower confidence intervals. This latter model is particularly efficient at estimating the mean, reducing the dispersion linked to the thickness of the tail of the distribution, which characterises parametric estimation of single question referendum models.

Table 5. Parametric estimation results (Standard deviation in brackets).

Parameter	Probit	Probit bivariate	Probit random effects	Probit interval data
$1/\sigma_1$	−1.1697 (.1091)	−1.1533 (.1076)	−1.1246 (0.0908)	−1.5440 (0.0193)
$1/\sigma_2$	−1.0068 (.1077)	−1.1176 (.1086)		
μ_1/σ_1	10.4921 (.9658)	10.3432 (.9546)	9.9383 (0.8029)	13.6166 (0.8215)
μ_2/σ_2	8.7676 (.9464)	9.7376 (.9556)		
ρ		0.5668 (.0710)	0.5351 (0.0722)	
Log-likelihood	−258.9/−288.1	−523.5	−531.79	−590.5
E(WTP)	11,524 (1.194)	11,636 (1.282)	10,333 (890)	8,374 (390.94)
MD(WTP)	7,887 (442.73)	7,872 (444.57)	6,891 (310.40)	6,769 (249.74)
UL-E(WTP)	14,240	14,655	12,399	9210
LL-E(WTP)	9722	9749	8944	7690
UL-MD(WTP)	8825	8,816	7528	7279
LL-MD(WTP)	7084	7069	6313	6297

Source: Authors' own elaboration.

Table 6. Non-parametric estimation result.

Parameters	Turnbull (Single bounded)	An and Ayala (Double bounded)
Media	7729	6585
Median	6250	5375

Source: Authors' own elaboration.

5. Non-parametric estimation of WTP

The excessive rigidity inherent in specific functional forms when explaining consumer behaviour led us to consider estimating WTP using non-parametric methods. The basic idea is that *a priori* there is no reason why consumer tastes should necessarily follow a particular distribution. The most straightforward non-parametric model is based on the idea that the demand curve should be non-growing in price. The approach developed by Kriström (1990) basically uses the sequence of proportions of affirmative responses for each bid made, sorted in ascending order. For large samples, these proportions are expected to decrease as the bid rises. Non-parametric estimates maximise flexibility and minimise, although do not eliminate, cases needed to estimate the survival function.

Non-parametric models used in contingent valuation are similar to those involved in the estimation of a survival function, in applications where the researcher is interested in estimating the probability that a phenomenon lasts for at period of at least t (Green 1998). The method consists of estimating the likelihood of accepting initial payments through some algorithm or iterative procedure, allowing the optimal and convergent solution to be found. The time variable that is commonly employed in other applications is replaced by the individual's subjective maximum willingness-to-pay, and the event to be predicted corresponds to the favourable response to the proposed valuation scenario.

When the WTP question is a single-bounded dichotomous choice, the non-parametric algorithm proposed by Ayer *et al.* (1955) can be used, and when double-bounded, Turnbull's self-consistent algorithm (1976) is employed. The non–parametric estimations are based on the algorithm proposed by An and Ayala (1996), which consists of an improved version of the Turnbull approach because it can deal with data group arbitrarily, common when valuing public assets (one application in the field of cultural heritage can be seen in Sanz 2004, Bedate *et al.* 2006. For the full development of the algorithm see An and Ayala 1996).

Single and double-bounded non-parametric estimates were performed using Matlab, the results of which can be seen in Table 6. The values found for the mean and the median are significantly lower than those corresponding to parametric methods, including those for the probit method with interval data.

Figure 2 shows the survival function obtained using parametric and non-parametric methods. It can be seen how the approach developed by An and Ayala estimates lower probabilities than parametric methods for a wide range of values. The greatest differences occur for higher values, with the probability estimated by the random effects and single-bounded probit methods way above those of the interval data and non-parametric methods. It is also interesting to note that this behaviour does not hold for the entire range of values, the interval data model estimating the greater likelihood for lower values.

When an entry fee is considered to improve the management or conservation of a resource or public asset, the manager is interested in determining the expected revenue that might be collected for a given price. The estimated survival function can be used to forecast tourist participation in the proposed activity and the expected revenue to be collected for an entry fee of, for example, 5000 Chilean pesos.

The non-parametric double-bounded approach yields the lowest estimated values with an expected participation of 50% of the tourists visiting the city of Valdivia, and with expected revenue of 20 million Chilean pesos. On the other hand, the probit interval data model forecasts 70% participation, and expected revenue of 28 million Chilean pesos. The

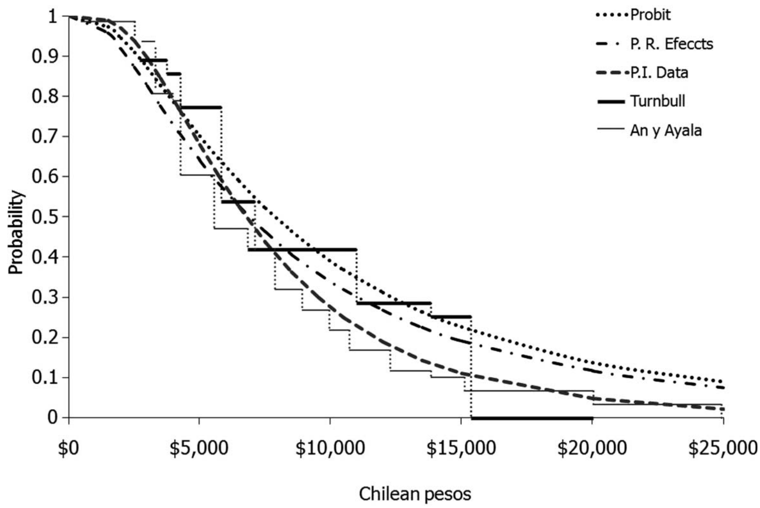

Figure 2. Survival functions for the various models estimated.

probit interval data model can yield conservative values for the mean and median WTP because of its larger distribution mass of lower values. This method, however, as in the example, can yield over-optimistic results for the demand and revenue forecasts for the prices being considered.

6. Conclusion

Estimating the economic value of historical heritage poses important methodological challenges. The paper shows that the contingent valuation method may be used for situations in which historical heritage, in addition to its symbolic value and in terms of identity, provides tourists with opportunities for cultural recreation. The city of Valdivia in Chile offers an interesting case study, due to its relatively small population and the existence of an important tourist activity. However, the geographical dispersion of buildings of historical value leads to difficulties when defining the tourist good to be valued. Planning a guided walking tour proved to be a viable option to estimate the value of a harmonic ensemble of cultural assets and one that might be used in similar situations.

The application of parametric methods to the double-choice dichotomous data shows patterns similar to those detected in previous studies. Responses to the two questions do not appear to be fully consistent with each other, reflecting possible biases linked to the inclusion of the second question. However, gains in efficiency may prove highly significant, particularly when the mean WTP is estimated. Non-parametric estimates yielded more conservative results, which also have the advantage of not being affected by the assumed functional form.

Estimating revenue which might be collected from charging an admission fee or some other form of payment emerges as a matter of interest in a contingent valuation of environmental and heritage assets. It might provide an initial estimate of revenue for a cost-benefit analysis for rehabilitation projects involving historical assets. Using the survival function, the participation probability at a certain price was obtained, and thus it was also possible to calculate expected revenue. It was found that the results are extremely sensitive to the estimation approach used. Although the probit interval data method is conservative when estimating central trend indicators (mean and median), it yields the most optimistic results for expected demand for low prices. Estimating revenue through the charging of admission prices requires greater accuracy on the survival function in ranges other than the mean and the median, a fact apparently not sufficiently recognised in the literature.

The results underpin the importance of explicitly addressing heterogeneity of preferences among individuals. Foreigners show a greater disposition towards participating in recreational cultural activities, and amongst local visitors those with relatives or friends who live in the city display less interest. In addition to being able to plan their own visits with the help of relatives or friends, this result might reflect the importance of differentiation and novelty involved in the valuation of cultural goods. Treatment of preference heterogeneity has emerged as a research topic with substantial potential for future development, including the integrated analysis of participation and valuation decisions.

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