CONTINGENT VALUATION AND CULTURAL POLICY DESIGN: THE CASE OF «NAPOLI MUSEI APERTI»⊗ .

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ABSTRACT. The aim of the paper is twofold: to carry out a contingent valuation (CV) study of *Napoli Musei Aperti*, a cultural public good provided by the city of Naples, and to explore some alternative schemes of cultural policy. Revealing individual preferences is a necessary condition for optimal provision of public goods, and of cultural public goods as well. Moreover, assessing the use value and the passive-use values (existence, option and bequest value), tacitly comprehended by the willingness to pay for cultural public goods, provides a basic information as far as the regulatory policy issues of the cultural sector are concerned.

As far as the economic evaluation of cultural public goods is concerned, only a few empirical CV studies can be mentioned. Willis (1994) quantified the user value for the Durham Cathedral; Martin (1994) valued the " Musée de la civilisation" in Quebec; Bille Hansen (1995) measured the total value of The Royal Theatre in Copenhagen; Scarpa *et. al.* (1998) estimated access value to the Contemporary Art Museum of the Castello di Rivoli (Turin); Whitehead , Chambers, and Chambers (1998) investigated the preservation value of an historic building located in St.Genevieve, Missouri. Frey (1997) provided a critical appraisal of CV in this area.

This paper presents some results of a CV study aimed to measure holistically the total benefits accruing to the local resident from maintaining the provision of *Napoli Musei Aperti*, a cultural public good provided in Naples. The present application combines and extends in several ways the previous CV studies carried out in the field. The distinctive features of our CV study are retraceable in the ways we set up the scenario, executed the survey, analyzed the data set, and derived policy implications for the cultural sector.

Our contingent valuation WTP estimates appear to have a reasonable size. The econometric analysis shows the usefulness of spike models when in the sample there is a large proportion of corner solutions (zero bidders); our findings also indicate that conventional logit analysis, based on the ignorance of the payment principle answers, provides a good approximation to the more complete spike model. As the effect of question formats on values is concerned, we obtained, as have others, a significant difference between discrete and continuous WTP estimates, with discrete format yielding a WTP larger than the open-ended format.

The second part of the paper explores policy and regulatory issues that could be designed and implemented through CV estimates. We consider and compare three stylized rules of supply of cultural public good, like *Napoli Musei Aperti*: market mechanism, public provision, private cooperative and voluntary provision. The system based on voluntary provision seems to be superior from different points of view: gratuity does not compel anyone to contribute; the total revenue is maximum (the whole consumer surplus would be collected); the total cost of provision is covered; nobody is excluded, either explicitly or implicitly, from the consumption of the good; through the voluntary contribution scheme, it is possible to collect money from all components of the total value: use value and passive use values. Finally some equity and fairness issues concerning the provision of a public cultural good are investigated. As far as income distribution is concerned the psychological *equity theory* is usually opposed to the theory of the independence of public goods individual provision from personal income. To explain why the poor are more willing to pay than the rich are,we stress the importance of the *network motive* in the voluntary provision of public goods.

INTRODUCTION

Revealing individual preferences is a necessary condition for optimal provision of public goods (Green e Laffont, 1979; Starret, 1988), and of cultural public goods as well. Moreover, estimating the economic value for cultural public goods provides a basic information as far as the regulatory policy issues of the cultural sector are concerned.

Assessing the use value and the passive-use values (existence, option and bequest value), tacitly comprehended by the willingness to pay for cultural public goods, however is a difficult exercise and requires non market techniques such as contingent valuation (CV) (Pommerehne, 1987; Mitchell e Carson, 1989; Hanemann, 1994).

CV is a survey based-approach, in which representative individuals are asked to report information about their maximum Willingness to Pay (WTP) to secure or to avoid the supposed change in the level of provision of the public good. Stated monetary information are contingent upon the simulated circumstances created in the survey.

Since the pioneering studies by Davis (1964) and Randall, Ives and Eastman (1974), an intensive research program has been devoted to the refinements in CV. As a result of this effort, CV has advanced and matured to such a point that it is now rapidly moving from being an esoteric and idiosyncratic economic instrument to the status of a useful and necessary informative tool. That happens not only in the USA, where the bulk of the empirical applications and methodological progress has taken place, but also all over the world. CV is now authorized and recommended by a growing number of national and international organizations and agencies, such as the World Bank, FAO, UNEP, and OECD; a recent bibliography by Carson *et al.* (1995) lists over 2000 papers and studies from over 40 countries (either developed or developing) on different topics. The international diffusion of CV, as well as the kind of valued goods and services, demonstrate its large adaptability to different socio-economic context, and its high flexibility with respect to the object of estimate (Navrud, 1995; Whittington, 1998).

As far as the economic evaluation of cultural public goods is concerned, to our knowledge only a few empirical CV studies can be mentioned. Willis (1994) quantified the user value for the Durham Cathedral; Martin (1994) valued the " Musée de la civilisation" in Quebec; Bille Hansen (1995) measured the total value of The Royal Theatre in Copenhagen; Scarpa *et. al.* (1998) estimated access value to the Contemporary Art Museum of the Castello di Rivoli (Turin); Whitehead , Chambers, and Chambers (1998) investigated the preservation value of an historic building located in St.Genevieve, Missouri. Frey (1997) provided a critical appraisal of CV in this area.

This paper presents some results of a CV study aimed to measure holistically the total benefits accruing to the local resident from maintaining the provision of *Napoli Musei Aperti*, a cultural public good provided in Naples. The present application combines and extends in several ways the previous CV studies carried out in the field. The distinctive features of our CV study are retraceable in the ways we set up the scenario, executed the survey, analyzed the data set, and derived policy implications for the cultural sector.

Wherever possible, we tried to place respondents in a situation incentive compatible, and we attempt to adhere to many of the most accredited devices, such as NOAA panel guidelines (Arrow *et al.*. 1993). Further, in the scenario we designed a particular sequence of valuation questions. Respondents are initially asked a general discrete choice question concerning whether or not they wish to donate some positive payment (payment principle question); then, for those agreeing to donate something, a further single bounded discrete choice

question is asked; finally, individuals "in the market" are followed-up by an open-ended question to state their maximum WTP. This questioning strategy splits the sample into two categories: those who are indifferent and those who find that the program improves their welfare; moreover, it generates a mixed data set (discrete and continuous variable) and it allows to compare WTP values obtained from single bounded discrete choice formats to those obtained from open-ended elicitation question. Single bounded discrete choice data sets are analyzed parametrically by conventional logit model and spike logit model, and non-parametrically through the Turnbull estimator (Kristrom, 1997, Haab and McConnell, 1997, Turnbull, 1976). For comparison purposes, estimation analysis is carried out both on the whole-sample data set and on data set with nonzero bidders using univariate specification model. Open ended bid valuation function of the whole sample is estimated by a Tobit censored regression model. We also explore how subjects perceive the discrete choice and the open ended follow-up questions when both question formats are posed to the same sample of respondents.

In this paper we pursue two main goals: to offer a reliable empirical contribution to the contingent valuation literature in the area of cultural goods, and to explore some alternative schemes of cultural policy.

Our contingent valuation WTP estimates appear to have a reasonable size. The econometric analysis shows the usefulness of spike models when in the sample there is a large proportion of corner solutions (zero bidders); our findings also indicate that conventional logit analysis, based on the ignorance of the payment principle answers, provides a good approximation to the more complete spike model. That is true either when the estimation involves the truncation at zero of the distribution of WTP function, or when the analysis is preliminary conducted on data set coming from sub-sample with nonzero WTP. Findings also supports the relative strength and flexibility of Turnbull estimator in incorporating zero bidders. As it concerns the effect of question formats on values, we obtained, as have others, a significant difference between discrete and continuous WTP estimates, with discrete format yielding a WTP larger than the open-ended format. However, we found that respondents to the follow up open ended question considered the bid used in the early discrete choice format as an implied value cue.

The rest of paper is organized as follows. Section I describes the good to be valued, the design and the administration of the survey. Section II present the collected data, the econometric models and estimation of WTP figures. Section III explores policy and regulatory issues that could be designed and implemented through CV estimates.

I. SURVEY

The good to be valued: **Napoli Musei Aperti.**

Napoli Musei Aperti (NMA) is a cultural public good provided by the city of Naples. The program *Napoli Musei Aperti* has been conceived to make possible to visit and enjoy important cultural, historic and artistic monuments and sites located in four central areas of the city, namely in the historic Roman ("Decumano" and "Spaccanapoli") and Spanish quarters. The cultural network includes 29 churches, 8 aristocratic palaces, 8 historical squares, and 1 museum. Until the program was started these public cultural goods were closed, not restored and not included in a recommended guided tour.

In 1996 NMA has been visited by about 814.000 people, both residents and tourists. At present the program is publicly provided by means of both local and national public funds.

Its total cost is about 2.200.000 ECU (4,3 billion lire) per year, which means 2,45 ECU (4800 lire) per each resident above eighteen years old (the minimum age of an Italian voter).

NMA is a mixed public good, subject to congestion. The daily capacity of the good is quite large - far more than the current annual total visitors - and in the past experience congestion has been a non-influent characteristic. Within this carrying capacity, we can describe it as a pure public good with zero marginal cost for additional users.

The design of the questionnaire

CV shares the same underlying logic to all economic (market and non-market) valuation methods: to measure the value of a good, the analyst has to observe people's choice. In particular, the analyst would observe both the *object of choice* and the *circumstances* of that choice, especially the consequences of such a choice in terms of substitution effects with other goods. When both the object of choice and the related circumstances are defined, the decision made in favor of the object implies that its value is at least equal to what was foregone to obtain it. Through CV survey, the analyst records individual choices in a hypothetical setting. The object of choice is represented by the change in the level of the provision of the public good to be valued, and the circumstances of the choice are the components of the virtual scenario (Smith *et al*.1997).

Although CV survey often seem to non-practitioners very easy to do, designing a CV questionnaire with very high content validity represents a very challenging task..

The key issues are the description of the good to be valued, the payment mechanism, and the context for valuation. Each component should be described by satisfying both theoretical requirements and the need for the respondents to understand and believe plausible the scenario where they are called for making the hypothetical transaction. The literature offer general warnings and guidelines to design (and successively to administrate) valid CV survey (Fischhoff and Furby, 1988; Arrow *et al*. 1993). Nevertheless, it is important to point out that the accuracy of final results does not depend only on the ability and carefullness of the researcher in designing a good questionnaire, but also on the availability of the respondent to behave in such a way as to produce a mutually beneficial outcome. As with any social research method, the validity of any CV study depends on the degree to which the interaction between subjects within the statistical game is co-operative.

The development of the questionnaire used in our CV study involved a focus group, pre-test, and a review of the proposed questionnaire by other researcher with experience in the design of contingent valuation surveys. Another step of questionnaire development was the determination of the bid vector to use in the single bounded discrete choice elicitation format stage. To achieve necessary information about bid range, we conducted during the June of 1997 a pilot test. A sample of 52 individuals was randomly selected from the Phone Directory and in a such a way as to represent all city districts. The WTP was elicited by an open ended format. This pilot test served also to further refine the questionnaire wording and to familiarize the interviewers with the material and other practical difficulties prior to the full scale survey.

The final questionnaire included four sections. In the first section we described the NMA program using illustrated map, and the economic modalities of its provision; then, we asked questions about past and recent visits to at least one of the cultural sites included in NMA network. In the second section, we asked people to reveal how many times they attend theatres, operas, ballets, concerts, museums and cinema. Given the average entrance prices for each item, the interviewer was able to estimate and remind to the respondent its personal

expense for cultural activities in the last 12 months. We introduced this remind to enforce in some way the respondents to consider a sort of budget constraint prior to give any valuation answer. The third section of the questionnaire was designed to collect information on voluntary monetary contribution for the continued provision of NMA program. We constructed the hypothetical scenario stating first the total and *per capita* current public expenditure sustained by city government for the provision of the NMA program, and then the average individual fiscal contribution. After, we asked individual to imagine that the local authorities could not be able to funding any more the NMA program because they could forced to invest all the money to stand up to other local social priorities. Then, we pointed out that the program could be still provided if each adult citizen offer a voluntary monetary contribution. We know from experimental economics that one of the most insidious trap of the WTP revelation is the actual structure of the provision of a public good. Many people do not trust the public administrators. In other word, even if people would like to contribute voluntarily, they are prevented by a supposed inefficient behavior held by public bureaucrats. Many individuals think that the state will waste their money. Hence to reduce this negative tendency, we proposed a mechanisms that could enforce a reasonable confidence in the utilization of the total private contribution. In the questionnaire we set that:

- the total amount of voluntary contribution for NMA could be managed by a non-profit agency;

- every year the citizens will be informed on the way money has been spent and on the reached results;

- the individual monetary contribution will be collected each year only if its amount would be sufficient to bear all the costs for supplying NMA Program, just as it is currently supplied by the Naples local authority. Else, the money would not be collected and the NMA program would be abandoned.

So far, we have illustrated many essential components of the scenario, namely: the source of the change (diversion of the public expenditures towards other local priorities); the reference (NMA program abandoned) and the target level (NMA program at the current state) of the good; the payment vehicle (monetary voluntary contribution); the decision-making unit (each resident over 18 years); the timing of the payment (annuity); the participants in the market (all residents over 18 years); and the rule of the provision of the good (total contribution should cover total cost). A further essential element of the scenario is the valuation questions. There are various ways to elicit WTP. In this survey, we adopted a multilevel questioning strategy in which the single bound discrete choice question was chosen as the primary valuation question. In the first level, respondents were asked whether or not they agreed to donate something for maintain the NMA. The aim of this so-called "payment principle question" was to validate refusals and reduce protest behavior. Only yes answer respondents passed to second level where they were asked a single bounded discrete choice valuation question. This format, introduced in a seminal article by Bishop and Heberlein (1978), is now dominating the CV literature and it has been endorsed also by the NOAA panel. Its popularity among scholars stems from its inherent market resemblance. Single bounded discrete choice involve asking respondents whether they would be willing to pay (contribute) specific amount and the amount is varied at random across respondent. We use a vector formed by ten bid amounts [5.000, 7.000, 10.000, 15.000, 20.000, 25.000, 30.000, 50.000, 75.000, 100.000]. The bid range was chosen to cover what we perceived, through the open-ended pretest, to be the likely range of WTP. Each bid was randomly assigned with equal probability to each respondents. In the third level, single bounded

discrete choice question was followed up by an open-ended (or continuous valuation) question. Respondents who agreed to donate the given bid were asked to specify the maximum amount they would willingness to donate to the special fund for the continued provision of NMA. Respondents who refused to pay the given bid were also asked to specify their maximum amount. In both case, the respondent were make awarded to give answers consistent to the choice made in the previous single bounded discrete choice stage. In other word, if the answer to single bounded discrete choice was "yes" the maximum WTP wont be lower than the posed bid. Vice versa, if the answer was "no" the maximum WTP must be lower than the assigned bid. To summarize, each individual was potentially asked to give three valuation responses: two discrete (yes or no) and one continuous (amount of contribution). For a sub-sample of respondents, this elicitation scheme generated a hierarchical data set, as we have multiple response nested within individual. For the whole-sample, the possible paths of response were as follows (in parentheses is indicated the location of the continuous WTP):

1. No (WTP = 0).

2. Yes $\Rightarrow$ Yes + continuous amount (WTP $\exists$ bid).

3. Yes $\Rightarrow$ No + continuous amount (WTP < bid).

It is clear that this combination of WTP question provides more statistical information to the analyst. However, it has a drawback: the potential anchoring effect of the proposed bid to the open-ended bids.

In the final section of the survey we asked a set of questions to better identify the socio-economic profile of the respondent. A copy of the full questionnaire is available from the Author upon request. Appendix I reports an excerpt of valuation questions.

The execution of the survey

A direct survey was administered in autumn 1997. The survey was conducted face-to-face by a large number of trained interviewers. The training emphasized the need of neutrality, and the nature of the survey. Five hundred individuals were drawn from citizens registered on the electoral roll. The electoral roll is an excellent sample frame since it is a legal requirement in Italy that all adults over 18 be registered. The selection has been conducted using a systematic rule, and a quota design to ensure sex and districts balance among the respondents. Another sample, of the same size and selected according the same criteria, was utilized as substitute to replace never reached individuals.

To each individual we sent by mail a single page letter on The University of Turin letterhead paper. The letter was designated to motivate respondent by explaining the policy relevance of the questions, the scientific purpose of the survey, the importance of representative participation, and the respect of the anonymity. Each letter was addressed to the individual and personally signed by the project director.

Almost 25% refusal rate was achieved. The final usable sample was composed by 468 citizens. The response rate for each question was consistently high except for the questions on delicate issues such as occupation and net personal and household income.

II. RESULTS

Sample description

Table 1 gives a summary of some socio-economic characteristics of the sample which on average reveals a high knowledge of the NMA program and a wide fruition of sites included in the NMA program. With regards to the other variables, our sample appears representative of general population over 18 years.

Table 1. Sample characteristics		
VARIABLE	MEAN	STANDARD DEV.
SEX	0.49	0.50
AGE	43.33	17.58
EDUC	10.6	4.54
EXPEND (Lit.)	87890	141500
KNOW	0.80	0.40
PASTVIS	0.57	0.50
NUMVIS	1.68	3.00
HOUSEHOLD	3.48	2.31

Note: SEX = 1 for male 0 for female; AGE = age of respondent (continuous variable); EDUC = years of instruction (continuous variable); EXPEND = expenditures in cultural activities; KNOW = Knowledge of NMA (1 for yes 0 for no); PASTVIS = visit to at least one of the site included in the NMA (1 for yes 0 for no); NUMVIS = visits to the NMA in the past twelve months (continuous variable); HOUSEHOLD = number of components of household respondent (continuous variable).

Results from payment principle question

226 respondents (48,3%), out of 468, answered negatively to the payment principle question. This proportion of people who choose not to contribute is unexpectedly high, considering the special features of NMA which includes sites and monuments of high historical and symbolic importance for Naples. We explored why a so large number of respondent decided to stay "out of the market". Primary recorded motive was genuine indifference towards the provision of NMA, and secondary reason was the assignment of eventual private contribution to other local social emergencies. Proportion of protest reasons, such as that government should provide for the provision out of taxes already paid, was not substantial. Dealing with protest zero bidders is a critical issue. We used the strategy to consider them as real zero bids. This results in conservative estimates of the public's WTP.

The payment principle question splits respondents in two sub-samples: sample A and B. Sample A includes the proportion $p = 0.517$ of respondents willing to donate something for NMA; sample B includes the proportion $(1 - p) = 0.483$ of respondent not willing to donate anything for NMA. Table 3 compares the characteristics of both sub-samples. The *t*-values shows statistical difference at 5% level of significance between the two samples with respect to all considered variables, except to household size.

Table 2. Comparison between in market and out of market sub-samples			
	SAMPLE A	SAMPLE B	
	Mean	Mean	t-value
SEX	0.50	0.45	1.68
AGE	40.8	46.06	-3.28
EDUC	11.7	9.47	5.35

EXPEND	124115	49105	5.93
KNOW	0.9	0.66	7.73
PASTVIS	0.7	0.40	7.48
NUMVIS	2.2	1.15	3.73
HOUSEHOLD	3.3	3.69	-1.94

The join impact of the above variables was analyzed by modelling the discrete yes/no response to the payment principle question using a probit regression. To account for the influence of districts where respondents live, we included in the qualitative regression model five dummy variables, as we divided the city of Naples in six homogeneous districts. Table 3 shows the estimation results of the "macro" decision of respondents: whether to be or not be in the market for NMA. The model predicts the actual outcome in about 66,26% of all cases. Moreover, among the explanatory variables, only the coefficients of EXPEND and KNOW are highly significantly different from zero. The sign of the estimated coefficients is positive for all variables except AGE and Q1.

Table 3. Probit model for the payment principle question

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Maximum Likelihood Estimates
Log-Likelihood..............   -276.5110
Restricted (Slopes=0) Log-L.   -324.1193
Chi-Squared (12)............     95.21660
Significance Level..........     0.1000000E-06
Variable  Coefficient  Std. Error   t-ratio Prob|t|   Mean of X  Std.Dev.of X
----------------------------------------------------------------------------
Constant  -1.0550       0.4010       -2.631  0.00852
EXPEND     0.18907E-05  0.6216E-06    3.042  0.00235   87893.     0.14150E+06
KNOW       0.91733      0.1832        5.007  0.00000   0.79915    0.40107
NUMVISIT   0.30946E-01  0.2326E-01    1.330  0.18346   1.6752     3.0070
AGE       -0.54683E-02  0.4004E-02   -1.366  0.17201   43.329     17.581
SEX        0.11362      0.1278        0.889  0.37391   0.49145    0.50046
EDUC       0.78477E-02  0.1684E-01    0.466  0.64122   10.603     4.5425
HOUSEHOLD  0.12038E-01  0.2956E-01    0.407  0.68380   3.4808     2.3169
Q1         0.87455E-01  0.3167        0.276  0.78246   0.16880    0.37498
Q2         0.42075      0.3086        1.364  0.17272   0.24145    0.42842
Q3         0.31803      0.3905        0.814  0.41544   0.51282E-01 0.22081
Q4         0.31697      0.3048        1.040  0.29837   0.23718    0.42581
Q5        -0.62976E-01  0.3048       -0.207  0.83630   0.25214    0.43470


Frequencies of actual & predicted outcomes
Predicted outcome has maximum probability.


          Predicted

Actual       0     1       TOTAL

   0       130    96        226
   1        62   180        242

TOTAL      192   276        468


Note: Q1, Q2, Q3, Q4, and Q5 are the dummy variables for the six districts.
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WTP estimation from single bounded discrete choice valuation question

As explained above, respondents who accepted to contribute for the continued existence of NMA were asked a further question on whether they would be willing to donate a specific annual amount (bid) drawn at random from the vector specified in the previous section of the paper. Table 4 reports the basic data set derived from the single bounded discrete choice valuation question for the whole sample. Table 4 incorporates non-participants (zero bidders); this allows us to compare both a conventional analysis based on the ignorance of mass probability at zero in the WTP distribution, and a spike-based analysis. For each bid the Table 4 displays the number of respondent facing that bid, the number of yes responses, the proportion of yes responses and the empirical survival function (e.s..f) of yes answers estimated using the pooled adjacent violators algorithm (PAVA) described in Kristrom (1990). Briefly, PAVA works as follows. Order the bids from the lowest to the highest, and

then calculate the proportions of yes answers. If the sequence of these proportions is non-increasing in bid, then the observed proportion is an estimate of probability of yes answers. If the sequence is not monotone non-increasing in some points, the violators are removed by averaging adjacent proportions. This smoothing procedure is repeated until the sequence of frequency assume the requested feature to be considered as estimate of probability. Table 5 reports data for the nonzero bidders (sub-sample A).

Table 4. Proportions of yes answers and Ayer et al. estimates of yes proportion.				
Whole sample				
Bid (Lit)	# of resp.	# of yes	% yes	e.s.f
5000	56	29	52	.54
7000	46	24	52	.54
10000	40	18	45	.54
15000	44	30	68	.54
20000	43	20	47	.47
25000	41	13	32	.32
30000	49	11	22	.24
50000	54	14	26	.24
75000	46	8	17	.23
100000	46	14	29	.23
total	468	181		

Table 5. Proportions of yes answers and Ayer et al. estimates of yes proportion.				
Sample A				
Bid (Lit)	# of resp.	# of yes	% yes	e.s.f..
5000	30	29	97	.97
7000	26	24	92	.96
10000	18	18	100	.96
15000	31	30	97	.96
20000	26	20	77	.77
25000	17	13	76	.77
30000	23	11	48	.54
50000	23	14	61	.54
75000	22	8	36	.45
100000	26	14	54	.45
total	242	181		

The discrete choice data set of Table 4 was analyzed using a conventional logit regression model based on the ignorance of the zero bidders, a spike logit model which employs all information coming from the two discrete choice valuation questions, and a spike Turnbull estimator; the spike is the probability that WTP is equal to zero. Logit model (either conventional or spike-based) is parametric as it is based on the assumption that in the population the latent true variable WTP follows a logistic distribution. Turnbull estimator is a non-parametric approach. To allow comparison among the different techniques, we adopted a simple univariate linear logit model which, according the random maximizing utility framework (Haneman, 1984), is given by:

$$\text{Prob(yes|Bid)} = \text{Prob(Bid} \exists \text{ WTP)} = F_\eta(\Delta V) = 1 - G_{WTP}(\text{Bid}) = [1 + \exp -(\forall - \exists\text{Bid})]^{-1}$$

where F_h is the c.d.f. of the random error $h = e_0 - e_l$, $DV = V(1, Y - Bid) - V(0, Y)$ is the difference in indirect utility function (1 represent the NMA and 0 represent the state of nature without NMA), $G_{WTP}(\text{Bid})$ is the c.d.f. of the random variable WTP, $\forall$ and $\exists$ are the coefficients to be estimated. In terms of Hicksian welfare measures, WTP corresponds to the equivalent surplus. The estimated survival function $(1 - G_{WTP}(\text{Bid}))$ can be interpreted as

an aggregate demand curve for discrete commodity. The log-likelihood function of spike logit model is shown in Kristrom (1997).

The results of the maximum likelihood estimation of conventional and spike logit models are presented in Table 6, which also shows the estimated logit equation for the sub-sample A which includes only respondents who answered they were willing to contribute some positive amount prior to answering the single bounded discrete choice question.

Table 6. Estimated logit models			
Variable	Whole sample	Spike	Sub-sample A
Constant	.64659E-01	.4281E-01	2.1703
	(.4495)	(.460)	(8.2622)
Bid	-.16342E-04	-.16778E-04	-.2814E04
	(-4.5807)	(-8.970)	(-5.7452)
Log-likelihood	-300.467	-433.413	-118.538
N	468	468	242
Note: asymptotic t-value in parentheses.			

In all three cases estimated coefficients have the expected signs and are significantly different from zero. As expected, the spike model is more efficient. The spike, calculated as $[1 + \exp (\forall)]^{-1}$ is equal to 0.49 which is very close to the actual proportion of people who declined to donate anything for the provision of NMA.

From the estimated logit equations, we calculated the expected value of the mean WTP, E(WTP), using the formula

$$\ln[1 + \exp (\forall)]/\exists$$

developed by Hanemann (1989) for a WTP distribution truncated at zero in the left side. When coefficients come from the sub-sample A, the overall mean (whole sample) is estimated by multiplying the partial mean (based only on sub-sample A) by the proportion of the population willing to donate something (p = 0.517). We also followed the same procedure also when we applied the Turnbull estimator to estimate a lower-bound for the E(WTP). The formula for the Turnbull estimator is:

$$E(WTP) = \Gamma B_j \ B_j,$$

where $B_j = [Prob(Yes*B_j) - Prob(Yes*B_{j+1})]$ and B_j is the bid.

Lower bound of E(WTP) for sub-sample A was calculated using the previous expression. Overall mean was estimated multiplying the partial mean by p. Table 7 reports mean WTP estimates. The second row E(WTP) displays the overall mean calculated upon partial mean value. It is interesting to note that the conventional logit with truncation of the distribution at zero provide a good approximation to the spike logit model. Moreover, there is not appreciable difference in the mean WTP values if the econometric analysis of conventional logit model in preliminarily carried out on the data from those respondent willing to pay something. As expected, all parametric mean WTP are bounded from below by the estimated lower-bound Turnbull mean.

Table 7. Single-bounded discrete choice estimates of mean WTP (Lit)					
	Logit[a]	Spike[b]	Turnbull	Logit[c]	Turnbull
E(WTP)	44420	42600	30050	80960	29560
E(WTP)	44420	42600	30050	41860	15280
N	468	468	468	242	242
Note: a = conventional logit; b = Spike logit; c = conventional logit. Formulas and procedures are indicated in the text.					

WTP estimation from the open-ended valuation question

Table 8 reports summary statistics for open-ended WTP. The skewness and kurtosis measures reveals that WTP open-ended distribution is skewed positively and leptkurtic.

Table 8. Statistics of open-ended WTP						
Mean	Max.	Min.	SD	Skew.	Kurtosis	N
16995	200000	0	30670	2.84	9.87	468
32870	200000	3000	36042	2.09	5.19	242

Researchers have consistently documented a particular anomaly in CV survey where open-ended valuation question format followed a discrete choice question mode. This anomaly is called *anchoring effect*, in the sense that the open-ended WTP values are not independent of the bids that were randomly distributed among the respondents. Anchoring might be viewed as a more general type of starting point bias. Our data set (sample A) shown this drawback. We found that for the respondents who met the lowest bids, the mean values were lower than the overall mean value; the opposite event happened for the high bid. The presence of anchoring was tested by regressing the open-ended WTP on the bid used in previous stage of the questioning scheme. Such a linear regression model revealed that the coefficient estimate of bid is statistically different from zero (t-value = 8.917). Further evidence of anchoring is given by the fact that open-ended WTP (Lit. 32870) approaches the mean of the bid vector (Lit.33700). The anchoring effect could be explained applying the psychological prospect theory of economic behavior (Kahneman and Tversky, 1979) . According to this theory (for further details see DeShazo, 1996) individuals identify a reference point and frame deviations from this reference point as either losses or gains; the valuation function with respect to reference point is asymmetric, steeper in the domain of losses than in the domain of gains. When respondent give a "yes" answer to the single-bounded discrete choice question he adopts a reference point equal to the distance between the posed bid and his equivalent surplus. If the answer is "no", the respondent does not form a reference point. Then, it is possible to suppose that open-ended questions preceded by a "yes" response were negatively framed and that questions preceded by a "no" response were unframed. According to the prospect theory respondents faced with negatively framed questions adopt a risk seeking and loss averse response strategy, while respondents faced with an unframed question are risk averse and could be truth revealing. Prospect theory predicts that respondent who face a negatively-framed question are more likely to answer the open-ended question with the posed bid in the single-bounded discrete choice question.

In practice, the framing model predicts that respondents negatively-framed will censor their stated WTP by simple restating the value to which they answered yes. Conversely, respondents facing unframed question have incentive to reveal a truthful (uncensored) amounts. Inspection of our data set seems to empirically support these predictions. The percentage of cases in which the stated WTP was equal (censored) to the posed bid was rather high (in average around 47%).

Comparison of WTP from single-bounded and open-ended data

As expected open-ended mean WTP value is lower than single bounded discrete choice mean. In the literature there are many explanations for this disparity. The argument of strategic bias is unlikely to apply to our case because we ask a donation payment vehicle. With donations, the incentive for understatement true WTP should be modest. One of the possible explanations is that answering to open ended question is a more difficult task as quantitative information is required. When cognitive difficulty and preference uncertainty are present, it is more likely for respondent to give lower values.

On the other hand, discrete choice data generally seems to be affected by a certain degree of yea-saying. Such phenomenon (i.e., yes answers were given independently of the bid) bias discrete choice estimates of mean WTP upward. Our data revealed to be affected by such compliance bias. For further details about this topic see Brown *et al*. (1996). If the two question formats would have acted in the opposite direction (open-ended format in downward, and single-bounded discrete choice in upward) then we could consider the estimated open-ended and discrete choice mean values as, respectively, lower bound and upper bound of the true mean WTP.

Valuation functions

It is common practice in CV studies to estimate a valuation function, i.e. a function that relates discrete choice or WTP with variables that are supposed to have an influence on the choice or on stated WTP amount. This explorative estimation can serve for two purposes. Firstly, it allows to perform a test of construct (theoretical) validity by determining whether choices or WTP amount are significantly related to covariates suggested by theory. Secondly, it could be used for transferring the sample results to populations different from the one from which the sample is drawn, and for taking into account non-respondents at CV survey provided that we know their characteristics.

The multivariate logit equation is shown in Table 9. The coefficients on the bid amount BID, expenditure in cultural activities EXPEND, previous knowledge of the NMA program KNOW, number of past visit to the sites NUMVISIT, were statistically significant at 0.01 level and of the expected signs. That means that individual having general and motivated interest in cultural activities and recreation are more likely to contribute for the continued provision of NMA program. The age of respondent and the size her household influenced negatively the attitude towards the contribution for the supply of public cultural goods. The estimated equation shown a relatively high percentage (82,2%) of right prediction.

Table 9. Multivariate logit valuation function

```
Maximum Likelihood Estimates
Log-Likelihood..............    -259.7884
Restricted (Slopes=0) Log-L.   -312.2838
Chi-Squared (13)............     104.9909
Significance Level.........    0.1000000E-06
Variable  Coefficient  Std. Error   t-ratio  Prob|t|õx   Mean of X  Std.Dev.of X
--------------------------------------------------------------------------------
Constant  -1.0784        0.7175      -1.503   0.13286
BID       -0.19944E-04   0.3959E-05  -5.038   0.00000   34331.       30577.
EXPEND     0.33769E-05   0.1046E-05   3.229   0.00124   87893.       0.14150E+06
KNOW       0.86392       0.3366       2.567   0.01027   0.79915      0.40107
NUMVISIT   0.99128E-01   0.4230E-01   2.343   0.01911   1.6752       3.0070
AGE       -0.98271E-02   0.7063E-02  -1.391   0.16414   43.329       17.581
SEX        0.11211       0.2205       0.508   0.61120   0.49145      0.50046
EDUC       0.41723E-01   0.2896E-01   1.441   0.14967   10.603       4.5425
HOUSEHOLD-0.44173E-01    0.5071E-01  -0.871   0.38373   3.4808       2.3169
Q1         0.58221E-01   0.5533       0.105   0.91620   0.16880      0.37498
Q2         0.48227       0.5365       0.899   0.36873   0.24145      0.42842
Q3         0.22011       0.6661       0.330   0.74106   0.51282E-01  0.22081
Q4        -0.55400E-01   0.5360      -0.103   0.91767   0.23718      0.42581
Q5        -0.22889E-01   0.5357      -0.043   0.96592   0.25214      0.43470

Frequencies of actual & predicted outcomes
Predicted outcome has maximum probability.

          Predicted

Actual      0     1     TOTAL

  0        234    53      287
  1         95    86      181

TOTAL      329   139      468
```

The open-ended valuation function is reported in Table 10. The multivariate linear equation were estimated using a Tobit regression model as data were censored at zero (Greene, 1987). Tobit models confirmed the signs and significance already observed in the logit function. Thus, the WTP was higher for individuals who consume and dedicate part of their income and time in doing cultural activities. The variable AGE presents a negative significant coefficient revealing that older respondents were willingness to donate less than younger respondents. Almost all other variables were positively related to WTP.

Table 10. Multivariate Tobit valuation function

```
CENSORED   regression
Maximum Likelihood Estimates
Log-Likelihood..............   -3065.418
Threshold values for the model: Lower=    0.0000    Upper=+Infinity
Variable  Coefficient  Std. Error   t-ratio  Prob|t|õx   Mean of X  Std.Dev.of X
-----------------------------------------------------------------------------
Constant  -34127.      0.1619E+05   -2.108   0.03499
EXPEND    0.57340E-01  0.1781E-01    3.219   0.00129   87893.      0.14150E+06
KNOW      29546.       7568.         3.904   0.00009   0.79915     0.40107
NUMVISIT  2560.1       804.0         3.184   0.00145   1.6752      3.0070
AGE       -316.84      150.5        -2.105   0.03528   43.329      17.581
SEX       531.25       4837.         0.110   0.91255   0.49145     0.50046
EDUC      246.56       639.2         0.386   0.69972   10.603      4.5425
HOUSEHOLD 94.058       1128.         0.083   0.93353   3.4808      2.3169
Q1        6992.8       0.1266E+05    0.552   0.58063   0.16880     0.37498
Q2        14858.       0.1226E+05    1.212   0.22541   0.24145     0.42842
Q3        16790.       0.1515E+05    1.109   0.26763   0.51282E-01 0.22081
Q4        12235.       0.1219E+05    1.003   0.31572   0.23718     0.42581
Q5        -2923.2      0.1232E+05   -0.237   0.81249   0.25214     0.43470
 Φ        44947.       2192.        20.506   0.00000
```

III. POLICY

CV, a method with great flexibility.

CV is now considered a useful measurement tools in many policy relevant issues.

First, CV can be applied for measuring economic values to be used in benefit-cost analysis of public projects. Investment programs selection, when *publicness* is concerned, is more efficient if the total value (use values and passive use values of the project) can be estimated.

Secondly, CV can be applied for judiciary purposes. The most renown case concerned the natural resource damage assessment following the Exxon Valdez ecological disaster of March 1989: 11 million of gallons of crude oil spilled into the see at Prince William Sound, Alaska. Several U.S. agencies and Court consider the CVM as a reliable instrument to estimate total values for public goods and bads.

Thirdly, direct surveys techniques, very similar to CV, have been applied to appraise, with reference to individual fiscal preferences, the way national and local governments allocate public expenditures (Throsby and Withers, 1983; Morrison and West, 1986; Piperno and Santagata, 1992; Withers, Throsby and Johnston, 1994; Throsby and Withers, 1995).

A further case for the CV as policy instrument is developed here in the main stream of the private supply of public goods (Weisbrod, 1988; Andreoni, 1988). Given standard consumer utility function for a public good, Q, and a private composite goods, X, the samuelsonian optimal condition for efficient supply of Q requires that the sum of individual marginal willingness to pay, Σw_i, equals the marginal cost of producing the public good. When the public good is discrete, like in the present study, total (aggregate) WTP must be equal or greater than the total (aggregate) cost, C, of the public good so that: $\Sigma w_i >= C$.

In both cases the failure of the market mechanism due to free riding behavior has been stressed, giving rise for a long time to a full rationale for public provision of public goods

(Throsby and Withers, 1986). Nevertheless, following the development of the literature on incentive compatible mechanisms (Green and Laffont, 1979), the accumulation of empirical evidence from experimental economics (Ledyard, 1995) and following also the improvements gained in survey design and in CV empirical implementation to control and limit strategic behavior, the revelation of sincere fiscal preferences is much more accountable and the private supply of public good more feasible.

Nevertheless, as far as a cultural good like *Napoli Musei Aperti* is concerned, the more serious problem seems to be the individual overvaluation, rather then free riding behavior with undervaluation. This is because cultural activities are a good charged with positive value and the voluntary contribution is supplied in an hypothetical setting. In the following analysis we use WTP data from open-ended questions. As we already mentioned in the previous Section, this source of the WTP could underestimate the true WTP, either for cognitive burden reasons (Tversky and Kahneman, 1981) or for anchoring bias. Nevertheless using open-ended WTP is the only way to work with individual data.

Mechanisms regulating the provision of a cultural public good.

As far as a cultural public good, like *Napoli Musei Aperti,* is concerned, we consider four stylised rules of supply.

Market. The cultural public good is provided through private mechanisms. NMA is like a pure public good when consumed from the outside; but a mixed public good when users are visiting churches and palaces. Exclusion is possible. Ticket or admission fee for personal consumption can be paid. The entrepreneur aims to profit maximization.

State. The good is provided by public institutions and funding is achieved through direct taxation. The admittance to the good may be free or subject to an admission fee, whose total amount is less then the total cost.

No profit. Provision is granted by patrons, foundations, and, less properly, by sponsors. Admission may be free and/or a fee can be charged.

Society. The good is provided trough voluntary contributions. The admission is free.

Results from the CV study of NMA allow us to compare three of the above systems of regulation (information about the "No profit institutions" scheme are not available) and to reiterate an interesting outcome by Willis (1994), concerning the willingness to pay for the Durham Cathedral.

The open-ended WTP revealed by the citizens of Naples is re-presented in Table 11, splitting among users, those who have experienced NMA, i.e. people having visited the good at least one time, and non users.

Table 11. Open-ended Willingness to Pay			
	Citizens (%)	Users (%)	Non users (%)
WTP = 0	48,3	34,1	67,2
WTP > cost per capita	51,5	65,9	32,8
Average WTP (Lit)	16.995	23.797	7.960
N. Obs.	468	267	201

Among the users, 34,1% do not want to contribute, but 65,9% would like to contribute an amount greater then the per capita average cost of NMA, estimated by the budget bureau of the city of Naples Lit. 4800. The WTP of users is Lit 23797. On the contrary, among non

users 62,7% declare a null WTP and only the 32,8% would pay an amount greater than the average per capita cost. Their average WTP is Lit 7960, that is one third of the users one.

Information to compare the three systems of regulation is presented in Tables 12 and 13.

The acceptance rate shows the percentage of citizens willing to pay at least the relative level of contribution (column one). The total revenue per 100 citizens is showed in the third column.

Market. The admission fee maximizing the total revenue is Lit. 50000. They would pay such a fee 15,3 citizens out of 100, that is those having a reservation price at least equal to Lit. 50000. Given that the users have been 815000 in 1987 and that the total cost of Napoli Musei Aperti has been 4,3 billion Lit, the aggregate maximum revenue should cover the total costs.

State. Free admission, financed by direct taxation is the current system. Nobody is excluded from the consumption of the public good and the total cost is covered by taxation. However 48,3 % of the citizens is charged by an average compulsory contribution equal to Lit. 4800; even if their willingness to pay is zero (* in Table 13). This could be considered an implicit form of exclusion, or of a forced inclusion.

Society. Admission is free. Voluntary contribution assures a total revenue equal to Lit 1686160, the amount of the individual willingness to pay per 100 citizens. Nobody is excluded. The total cost is covered by voluntary contribution. Like in the CV on the Durham Cathedral (Willis,1994), the amount of voluntary contribution is greater than the maximum total revenue we could get from the market system. It should be noted that a perfect discriminating and omniscient monopolist could get the same outcomes. The difference is that the monopolist would obtain this result by discriminating, that is excluding from consumption those who reveal a zero WTP.

Table 12 .Willingness to Pay and total revenue		
WTP (Lir)	Acceptance rate	Total revenue Per 100 citizens
0	100	0
3000	51,7	155100
4800	51,5	247200
5000	51,3	256500
7000	45,1	315700
10000	42,7	427000
12000	32,3	387600
15000	31,8	477000
20000	25,6	512000
25000	20,9	522500
30000	18,3	549000
50000	*15,3*	*765000 max*
60000	7,8	468000
70000	7,6	532000
75000	6,7	502500
100000	6,1	610000
150000	1,0	150000
200000	0,6	120000

Table 13.Comparing regulation system of Napoli Musei Aperti						
Model	Price	Total revenue per 100 citizens	Total cost covered	Excluded per 100 citizens	Excluded 0>WTP<50000 per 100 citizens	Excluded WTP=0
Market	50000	765000	Yes	84,7	36,4	48,3
State	(4800)	(480000)	Yes	48,5*	0	48,3*
Society	0	1686160	Yes	0	0	0

The system based on social institution (Society) seems to be superior from different points of view:

- gratuity does not compel anyone to contribute, both through taxation or fees;

- in relative terms the total revenue is maximum (the whole consumer surplus would be collected);

- the total cost of provision is covered;

- nobody is excluded, either explicitly or implicitly, from the consumption of the good;

- through the voluntary contribution scheme, it is possible to collect money from all components of the total value: use value and passive use values;

- given that to declare a WTP equal zero is simply an economic evaluation it could be possible that gratuity positively incentivate a further consumption of cultural goods.

Equity, altruism, network motive and private provision of cultural public goods.

Individual contributions for the private provision of a public good do not appear to reflect the logic of an *absolute* free riding (Bohm, 1984; Throsby and Withers, 1986). This important outcome established by experimental economics and survey research, however, poses a considerable question. Why do individuals deviate from induced Nash contributions in economic experiments? Two theories, referred in the literature as "reciprocity in group-interest" as a kantian rule (Sugden, 1984) and the "warm-glow" effect (Andreoni, 1988,1989) concern both the contributions to public goods and to private charites, often modelled as a public good. Both explanations aim to be very general and apply to individuals, no matter how they differ in terms of socio-economic attributes. Subsequent research has aimed to take into account of the difference in terms of income distribution. As far as income distribution is concerned the psychological *equity theory (*Walster E.G., Walster W. and Berscheid E., 1978) is opposed to the theory of the independence of public goods individual provision from personal income (Warr, 1983; Bergstrom, Blume and Varian, 1986). In particular the *equity theory* conjectures that individuals consider *fair* that all citizens contribute an *equal rate of their income* for the provision of a public good. A loss of utility is expected both from contributing a lower rate or a greater one. In other words there would be a psychological damage in getting involved in non fair relationships. Some laboratory experiments seem to reject the model of Warr (1983) and to support the

equity theory, in the sens that, in order to reduce the provision rate to an equal rate, *low-income citizens tend to overcontribute*, while *high income citizens tend to undercontribute* for the provision of a public good (Chan et al., 1997).

Data on WTP for NMA do not concern individuals informed on the WTP stated by the others members of the community. In any case they do not confirm the predicted behavior implied by the *equity theory*. Table 14 shows the relation between the WTP and the *family* income of a representative sub-sample of 201 individuals - those that declared their family income. As the income grows, the voluntary contribution, considered as a per cent rate of the income, decreases, while the equity theory suggest a tendency towards an equal constant rate (see Table 14).

Table 14. WTP and family income		
Monthly family income	Rate % of wtp over monthly family income	Wtp=0 (% into the bracket)
0-1 million lire	2,62 (21; 4,9)	52,4
1-2 millions lire	0,87 (75; 1,5)	56,0
2-3 millions lire	0,76 (61; 1,0)	32,8
3 millions lire and beyond	0,62 (44; 0,8)	29,5
(in brackets n.obs and std. deviation)		

Three different explanations of this phenomenon shall be discussed.

a) The rich provides a lower rate of contribution because, instead of following the *equity theory* perspective, she/he makes reference to a supposed standard value of the public good. It does not make sense that a millionaire provides the one per cent of his/her large income for a very modest public good.

b) The second explanation is based on the fact that the poor seems more altruistic than the rich. For instance, comparing in our data set low-income and non users individuals with high-income individuals visiting *Napoli Musei Aperti* at least four times a year, we find that the poor reveal a per cent contribution rate twice greater than the rich. A variant of this motive could be the theory of the *impure altruism* or *warm-glow* effect (Andreoni, 1988, 1989). According to Andreoni people have an extra private argument in their utility function, namely their own donation and the relative benefits that they can get from the warm-glow of donation *per se*. However, this approach applies to *all* individuals, both to the poor and to the rich, and it is problematic to extend it to the case in object.

c) The *network motive* suggests that the poor could be interested in a special way to consume cultural public goods. The poor is highly interested in the production of *networks*, *relational public goods*. The *publicness* of a network is a clear-cut characteristic, including the fact that adding one more member to a network not only does not reduce the consumption of the network by the others, but increases its quantity. In this sense the poor reveals a greater WTP for the private provision of public goods because is more accustomed to their production and more dependent on their provision. This could hold with reference to the history of the working class and to the efforts for mutual assistance. But this could hold too with reference to modern private production of very local public goods: legal public goods, like a protective legal agency made of lawyers collectively paid; medical public good, like a mutual aid agency; cultural public goods whose identity component is a real resource for the poor.

The analysis of the *network motive* in the voluntary provision of public goods is deserving of further research, perhaps adding new insights to a phenomenon usually analyzed in terms

of *impure altruism* or of *reciprocity* (Sugden, 1984). Finally, the network motive may add another reason for a minor relevance of the free riding behavior in the private provision of public goods.

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APPENDIX 1. The Willing-To- Pay Questions

« To face social emergencies that hit the city, the Naples local authority could decide <u>not to fund the NMA Program anymore</u>. Let s imagine that, as it happens in other Italian cities of art, every citizen could be let free to supply <u>a personal voluntary contribution substituting current public funds provided by the collection of local taxes</u>.

- Would you like to offer a yearly voluntary money contribution in order to preserve the NMA Program ?   (yes/no)

- If yes, given that your expenditure in culture is estimated at L. .... , and assuming that it will be unchanged for the next year, would you like to offer yearly L. .... (one bid randomly selected from a bid vector) ?

- In any case would you like to tell us which is your maximum wtp ? L. ....»