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Embedding effect and the consequences of advanced disclosure: evidence from the valuation of cultural goods

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Abstract

This study revisits the embedding effect, a long-standing problem in the nonmarket valuation literature. The embedding effect was a popular research topic during the 1990s, especially following the Exxon Valdez oil spill in Alaska. It has resurfaced after a special issue of *The Journal of Economic Perspectives in 2012* in which Jerry Hausmann asserts that among the three long-standing problems with contingent valuation, the embedding effect is the most challenging. In this study, we focus on how information disclosure regarding the nested structure of goods affects both the willingness to pay and the presence of the embedding effect. Our results suggest that the level of embedding can be reduced with a more complete description of the nested structure of the goods under valuation. Therefore, it is highly important for each valuation study to test whether sufficient information is provided on the goods' nested structure to ensure that the relationships among the goods' subsets are correctly understood by respondents. We show that by providing respondents with more high-quality information, it is possible to mitigate the embedding effect.

Keywords Embedding effect · Contingent valuation · Nonmarket valuation · Cultural goods

1 Introduction

This study revisits a long-standing problem in the nonmarket valuation literature, especially with regard to contingent valuation (CV): the *embedding effect* (EE; Carson (2012); Hausman (2012)). The EE was a popular research topic in the 1990s, particularly following the Exxon Valdez oil spill in Alaska (Carson et al. 2003) when there was a great deal of discussion among researchers regarding the reliability of

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the CV method (Arrow and Solow 1993; Diamond 1996; Diamond and Hausman 1994; Fischhoff et al. 1993; Hausman 1993).[1]

The topic resurfaced in a special issue of *The Journal of Economic Perspectives (2012)* in which Hausmann ("From Dubious to Hopeless") asserts that three long-standing problems with CV have not been properly addressed in empirical analyses: (a) hypothetical bias, (b) large differences between willingness to pay (WTP) and willingness to accept (WTA), and (c) the EE. Hausmann states that the latter is the most challenging. Since that article's publication, a few studies using CV have identified the presence of EE in CV (Fogarassy et al. 2016; Grammatikopoulou and Olsen 2013; Jørgensen et al. 2013; Tebbe and von Blanckenburg 2018), but they do not explore the mechanisms for controlling or reducing this effect, in spite of the existence of a great deal of methodological guidelines for stated preference applications such as Johnston et al. (2017).

Recently, Bishop (2018) revisits both the discussion related to the EE and reiterates the suggestion given by the NOAA panel (Arrow & Solow 1993, p. 4,609) that surveys need to provide rich information, including information on substitutes, to reduce several biases in CV. In fact, this argument is aligned with Hausman (2012), who claims that CV applications provide respondents with little information due to time constraints and concludes that the values obtained using CV should not be used as information for policy decisions. If Hausman's statements are correct, then better information and more time to respond to survey questions may reduce the EE.[2]

In the 1990s, opponents of CV claimed that responses from CV studies do not satisfy the properties required by economic theory and therefore, the values obtained in the application of the method do not reflect a legitimate assessment of economic value (Boyle et al. 1994; Diamond et al. 1993; Kahneman and Knetsch 1992). In their article, Kahneman and Knetsch (1992) [KK hereafter] present a series of CV applications whereby people allegedly reacted in an unexpected manner (from an economic perspective) to the scope of goods under valuation, to the order in which the goods were presented, or to the nested structure of a set of goods. KK call this phenomenon the EE. KK argue that CV does not measure the economic value of a good in a meaningful way. For them, responses to a CV experiment are similar to a qualitative ranking of the importance of the good under valuation and should be considered a "*purchase of moral satisfaction,*," suggesting that when people respond to CV questions, they only express how important the good is to them.

Several authors argue against KK´s interpretation (Bateman et al. 2004; Carson et al. 1998; Carson et al. 2001; Carson and Mitchell 1993; Carson and Mitchell

[1] The academic interest in embedding in CV declined in part due to irreconcilable differences regarding this issue and in part due to the eruption of choice experiments in nonmarket valuation (Adamowicz et al. 1998; Alberini et al. 2006; Ryan 2004) and the belief that choice experiments are less prone to the embedding effect (Foster and Mourato 2003; Goldberg and Roosen 2007)). Nevertheless, several papers addressing the EE in choice experiments show mixed results (Czajkowski and Hanley 2009; Jacobsen et al. 2008; Jacobsen et al. 2012).

[2] The role of information in consumer responses has a long history in the economic literature. Green and Blair (1995) show that emphasizing certain aspects, such those that are political, rather than the instrumental characteristics of goods affects the variance of the WTP, while Adaval and Wyer (1998) show that the way in which information is transmitted to consumers affects decisions made in the realm of tourism. In reference to a private good, Magistris et al. (2015) show that the inclusion of information on quality certification affects the WTP for a product. Their results suggest that the use of information significantly affects WTP, while the provision of neutral information does not produce changes in WTP..

1995; Harrison 1992; Smith 1992). For instance, Smith (1992) claims that poor description of the good under valuation, mistaken selection of a survey instrument's design, or incorrect analysis of results could explain most of the CV anomalies. Carson and Mitchell (1995) also argue that KK's study does not properly apply CV. They suggest that a CV study must fulfill several criteria to avoid the EE or the purchase of moral satisfaction. Furthermore, Carson and Mitchell (1995) claim that amenity specification biases and inadequate survey designs may be responsible for some of these anomalies. Previous studies (Carson et al. 1998; Hanemann 1994; Randall and Hoehn 1996) also show that the EE could be estimated by conventional utility theory and from different substitution patterns among goods.

Bateman et al. (2004) classify the EE into *sequencing effect* and a lack of *scope sensitivity (scope insensitivity)*. Furthermore, Bateman et al. (2006) extend this classification to four "arguably anomalous" results: *ordering effects, scope insensitivity, visible choice-set effects and part–whole/substitutions effects*. These effects are related to both the way in which the goods under valuation are presented to the respondents (inclusive versus exclusive list), and the extent of the options available during the valuation exercise (visible choice set). In an inclusive list, the goods under valuation are presented as additions to (or subtractions from) any good presented previously in that list, whereas in an exclusive list the goods under valuation are presented as mutually exclusive alternatives to an unchanging status quo.

Both approaches have potential drawbacks. In the inclusive list, the value of a specific good could depend on the position of that good on the list—this is known as the *sequencing effect*. There is evidence that the existence of a sequencing effect is therefore consistent with the economic theory when using an inclusive list (Carson and Mitchell 1995). Economic theory would predict the existence of a sequencing effect under these conditions because of the income and substitution effects that occur as respondents become progressively more cash-poor. In the exclusive list, and if the valuation questions are perceived as independent by the respondents, any change on the good's value (due to its presentation in the list) is known as the *ordering effect*. This effect is considered a bias, possibly originating from cognitive psychological issues (Bateman et al. 2004).

Regarding the visible choice set, Bateman et al. (2004) define two options: advance disclosure and stepwise disclosure. In the former, prior to any valuation questions, the respondent is told about the full choice set to be valued, whereas in the latter, each valuation task is performed without disclosing the next valuation task. The selection of the visible choice set could affect the lack of *scope sensitivity,* which is observed when the mean WTP for a good does not change with changes in the good's quantity or quality. Finally, according to (Bateman et al. 2006), the *part–whole (substitution effect)* bias arises when the value of the sum of subsets is higher than the value of total good.

In this study, we focus on how information disclosure regarding the nested structure affects WTP and the EE, with focus on *scope sensitivity and part–whole anomalies*, for cultural goods. In our application, we use an inclusive list in which all goods are an addition to the previous goods. Unlike Bateman et al. (2004), we do not compare stepwise disclosure against advance disclosure. Instead, we change the visible choice set under valuation by providing either limited information of the nested

structure of our goods or full information of the nested structure, in line with Carson and Mitchell (1995). While the latter can be considered as an advance disclosure of the nested structure of the goods, in the former, the respondents only face a fixed amount of information regarding a subset of the goods under valuation, but we do not provide additional information in successive steps. Unlike Bateman et al. (2004), in our "limited information" case do not ask people an unconstrained second valuation question. In this regard, our approach is designed to test both scope sensitivity and part–whole bias under limited information or advance disclosure (Bateman et al. 2006; Boyle et al. 1994). Hereafter, we will call both scope insensitivity and part–whole bias as "EE," and we will refer to the specific term when needed.

Cultural goods may be prone to the EE since some can be broken down into several subsets. For example, an art gallery may manage different cultural activities and collections that could be valued separately from one another. We examine how the embedding of goods (nested structure) affects the valuation of a cultural good, and we evaluate whether revealing the nested structure of goods (advance information disclosure) to respondents reduces the EE. Our findings suggest that through advance disclosure of the nested structure, scope insensitivity and the part–whole bias are avoided. We conclude that the EE is a result of inadequate survey design and therefore, can be rectified by advance disclosure of a good's nested structure.

2 Materials and methods

The economic analysis of cultural goods is not new. Throsby (1990) is the first to use CV for cultural goods, whereas Throsby (2003) notes that CV would not capture certain aspects of the value of cultural goods. Moreover, multiple institutional factors and the physical and cultural characteristics embedded in cultural goods make the comparison of values across different sites unreliable (Tuan et al. 2009).[3]

Huu Tuan and Navrud (2009) assess the adequacy of dissonance-minimizing formats to preserve the cultural heritage of a site in a developing country. This question format allows more inclusive valuation, thereby capturing different attributes and dimensions of a public good. Plaza (2010) discusses the adequacy of CV and discounted cash flows to value global art museums in Spain, while Poor and Snowball (2010) also use a CV study to compare the economic values of two university campuses, one in South Africa and the other in the USA.

Báez and Herrero (2012) measure WTP for cultural goods in Valdivia, Chile, and feed their results through a cost–benefit analysis to design a restoration policy. Finally, Giannakopoulou et al. (2017) conduct a CV study to obtain WTP for the conservation of a historical region in Greece. Despite these contributions, the analysis of both the EE and the role of a visible choice set remains in its infancy within this field.

[3] A review of CV applications on cultural goods can be found in Noonan (2002), Noonan (2003), and Navrud and Ready (2002).

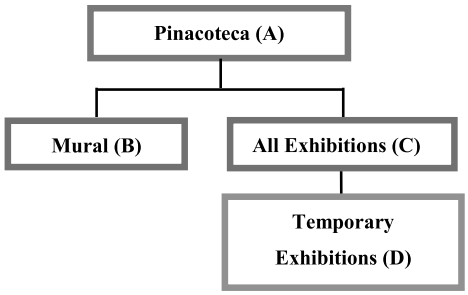

Fig. 1 Decomposition of goods housed at the Pinacoteca

2.1 Case study: the cultural center of the "Universidad de Concepción Art Gallery"

A cultural center known as the "*Pinacoteca*" (art gallery) or "Casa del Arte" (House of Art) is a building located at one of the entrances to the central campus of the Universidad de Concepción, which is located in the city of the same name in south-central Chile. Due to tradition and the University's social commitments, access to the gallery is free of charge for any cultural event.

For more than 50 years, the *Pinacoteca* has hosted most of the city's cultural activities, including exhibitions of important collections of art and several exhibitions of works by artists such as Picasso and Matta. Its lobby displays a mural called "*Presencia de América Latina*" (The Presence of Latin America), painted between the years 1964 and 1965 by Mexican artist Jorge González Camarena. The mural has recently been declared a "Historical Heritage Site" by the Executive Secretary, who directed the bicentennial celebration of the Chilean Republic. The mural is 260 square meters in size and displays the genesis of the Latin American continent, highlighting its cultural and ethnic values, and promoting the unity and goodwill of Latin American culture.

The *Pinacoteca* also holds both permanent and temporary exhibitions in the gallery's five exhibition rooms. Permanent exhibitions use three rooms called *Tole Peralta*, *Grandes Maestros* (Great Masters), and *Generación del Trece* (Thirteenth Generation). The *Pinacoteca* houses one of the most complete and extensive collections of Chilean paintings, including 1900 art pieces. Meanwhile, temporary exhibitions are displayed in two rooms: the *CAP foundation* and *Marta Colvin*. Temporary exhibitions display paintings and several other forms of art such as pottery, sculptures, flowers, animals, pictures, and others. National and international artists are invited to participate and present their work at these exhibitions; works by artists such as Roberto Matta, José Vicente Guajardo, and Pablo Picasso have been displayed in these rooms.

Figure 1 shows the four different "goods" included as part of the Pinacoteca. At the upper level is the Pinacoteca itself, which includes both the mural and the *Temporary Exhibitions*, which is a subset of *All Exhibitions*. The figure below illustrates potential levels of embedding in the *Pinacoteca*.

2.2 Survey design and implementation

In our design, we reproduce the KK setting almost exactly by using an inclusive list rather than an exclusive list, which is more likely to show the EEs (*lack of scope sensitivity and part–whole bias*). In this way, we "allow" the data to exhibit some level of EE. As Carson et al. (1998) show, the EE can be consistent with economic theory when goods are substitutes and when the design uses an inclusive list. We use an open-ended elicitation format and a split-sample approach, which have both been used by Bateman et al. (2004) and Clark and Friesen (2008).

In our setting, some individuals received information exclusively about the good under valuation, with no reference to other related goods (referred to as limited information), while another group received information about all goods provided by the art gallery, after which they were asked to value a specific subset (referred to as *advance disclosure*).

In this study, we present a scenario specifically establishing that the good under valuation would be "shut down" or that the public would lose access to the good if insufficient funds were allocated to pay for the activity's maintenance costs. We described this value as the "c*onservation of heritage and cultural activities*" at the *Pinacoteca* or of any of its components (subsets). Our setting resembles a provision point mechanism, in which the good will only be provided if the population contribute to cover the cost of the provision of the good. This mechanism improves the incentives to contribute to the good provision reducing free-riding behavior (Khong et al. 2019; Poe et al. 2002; Swallow et al. 2018).

Furthermore, following Carson and Mitchell (1995), we used categorical nesting. We considered four goods: A (*Pinacoteca*), B (*the Mural*), C (*All Exhibitions*), and D (*Temporary Exhibitions)*. D is a proper subset of C (*C*□*D*); B, C, and D are proper subsets of A, and B is the complement[4] of C. There are different levels of potential substitutions for each of these goods, where good A covers the whole building; however, the mural cannot be moved to another location. The exhibitions may be moved to other buildings. With this setting, we evaluated whether the EE exists in the valuation of these goods and whether this effect can be reduced through changes made to the description of the goods under valuation.

Our scheme combines the original KK design and a variation of this design based on suggestions made by Carson and Mitchell (1995). Carson and Mitchell's hypothesis is that the embedding is caused by the vague and incomplete description of the good in KK´s experiment, and especially because the relationships between the goods under valuation were not specified to all respondents. Therefore, the presence of embedding may be attributed to the fact that, for example, individuals were never told that D is a proper subset of C or A.

We conducted 420 face-to-face surveys from October to December 2008 in Concepción, Chile, obtaining 348 useful observations. This is because out of 420 planned surveys, only 404 surveys were completed, the remaining 16 surveys could

[4] We used this complement in the way it is used under set theory and not in an economic sense. Rather, $B^c = C$ and B U C = A.

Table 1 Description and coding of each subsample

Subsample	Target Good	Information Treatment	Coding for WTP
1	Pinacoteca and its goods	Complete	Pinacoteca = A1 Mural = B1 All Exhibitions = C1 Temporary Exhibitions = D1
Study I			
2	Mural	limited information	Mural = B2
3	All Exhibitions	limited information	All Exhibitions = C3 Temporary Exhibitions = D3
4	Temporary Exhibitions	limited information	Temporary Exhibitions = D4
Study II			
5	Mural	Advance disclosure	Mural = B5
6	All Exhibitions	Advance disclosure	All Exhibitions = C6 Temporary Exhibitions = D6
7	Temporary Exhibitions	Advance disclosure	Temporary Exhibitions = D7

not be carried out due to rejections especially in the high-income groups. Also, a small number of surveys were eliminated due to incomplete data, protests, and rejections to the hypothetical scenario (13.9% of the surveys). The sample was divided into seven subsamples. We pre-tested the sample with students enrolled at a local university and applied pilot surveys to ensure that the wording, images, and other visual aids used would be understood by the respondents.

Table 1 shows the distribution and coding of each subsample whereby *Pinacoteca* is defined as A1 and the number placed at the end of the code denotes the sample number. The *Mural* is represented by the letter B, and numbers 1, 2, or 5 show that values were taken from subsamples 1, 2, or 5, respectively. Finally, *All Exhibitions* are denoted by C, while *Temporary Exhibitions* are denoted by D. Each subsample contains different respondents. In the treatment of information, we included a version with limited information about other related goods (subsample 2,3 and 4) and a version with advance disclosure (Subsample 5, 6 and 7).

The first subsample, where respondents received a full description of all goods housed at the art gallery including *the Mural* and the *Exhibitions,* was used to value the *Pinacoteca* as a whole. Following KK, we used a top-down valuation sequence where after being given a description of these goods, participants were asked about their WTP to preserve services provided by the *Pinacoteca*. Then, after a value for the whole good was established, participants were asked to deconstruct this value among the subgroups of goods.[5]

[5] This setting implies that the value of the WTP for each good in the sequence depends on the overall WTP. This may be problematic when drawing a split-sample comparison. However, we followed KK's approach as closely as possible, such that differences in findings could be attributed exclusively to the treatment of information; therefore, we maintained their design.

The remaining six subsamples were divided into two groups. The first group, called "**Study I: Limited Information,**" includes subsamples 2, 3, and 4, in which limited information is provided to the interviewees. Subsample 2 presents respondents' valuations of the *Mural* alone. Subsample 3 presents the valuation of *All Exhibitions* and deconstructs it to determine the value of the *Temporary Exhibitions* using the same approach as that applied to subsample 1. Finally, subsample 4 presents the valuation of the *Temporary Exhibitions* alone. Subsamples 1 through 4 have the exact same design as that used in KK's research, and therefore, we expected to find the EE. In this way, Study I closely followed most previous experiments conducted on the EE, as Study I adopted what Carson and Mitchell (1995) would call a vague and incomplete description of the good and the relationships among its components.

For instance, for Study I, subsample 4, *Temporary Exhibitions*, respondents were told the following:

> In this study, I will give you information about Temporary Exhibitions of art taking place in the Pinacoteca of the Universidad de Concepción. After that, I will ask you about your WTP to preserve the contributions of these Temporary Exhibitions to our city's cultural activities.
> The Pinacoteca is located at one of the entrances of the Universidad de Concepción campus. In this building, Temporary Exhibitions of art take place (they last for short periods of time), displaying paintings, pottery, pictures, engravings, and sculptures, among other works. The Exhibitions are displayed in two rooms called **CAP foundation** and **Marta Colvin**. The Exhibitions have displayed works by both national and international artists such as Picasso, José Vicente Guajardo, and Roberto Matta, among others. Let me mention that one of the most visited Temporary Exhibitions was presented last year (2007). It was called 'TOROS of Picasso-Neruda,' and it showed a joint collection of Neruda´s poems and Picasso´s paintings relating to the Spanish civil war.

Therefore, respondents of this subsample only received information about the *Temporary Exhibitions*; no reference to other goods displayed at the *Pinacoteca* (specifically the *Mural* and the permanent exhibitions) was made. While some participants may have been familiar with the *Pinacoteca* and the *Mural*, we did not provide any information about these works to make it clear that we were only asking about the *Temporary Exhibitions*.

The second group of subsamples, called "***Study II: Advance Disclosure,***" in Table 1 includes subsamples 5, 6, and 7. These subsamples were given the same goal as the previous ones. However, unlike what was done for ***Study I***, for each of the surveys given, regardless of the good under valuation, respondents were provided with a complete description of goods housed at the *Pinacoteca (advance disclosure)*. For example, for subsample 7, information was presented as follows:

> In this study I will give you information about the Universidad de Concepción. After that I will ask you about your WTP to preserve contributions of the Temporary Exhibitions to our city's cultural activities.

> The Pinacoteca building is located at one of the entrances of the Universidad de Concepción. In this building, Permanent and Temporary Exhibitions of art take place (they last for short periods of time), displaying paintings, pottery, pictures, engravings, and sculptures, among other works. These Exhibitions are displayed in five rooms with two dedicated to Temporary Exhibitions and the other three reserved for Permanent Exhibitions. The two rooms reserved for Temporary Exhibitions are called **CAP foundation** and **Marta Colvin**. The Exhibitions have displayed works by both national and international artists such as Picasso, José Vicente Guajardo, and Roberto Matta, among others. Let me mention that one of the most visited Temporary Exhibitions was presented last year (2007). It was called 'TOROS of Picasso-Neruda,' and it showed a joint collection of Neruda´s poems and Picasso´s paintings relating to the Spanish civil war.[6]
> The rooms for Permanent Exhibition are called **La Generación del Trece**, **Tole Peralta,** and **Grandes Maestros**. They host an important collection of Chilean paintings, with a total of almost 1900 original paintings dating from colonial times to the present day.
> Furthermore, in its main lobby the Pinacoteca displays a mural called 'Presencia de América Latina,' painted between 1964 and 1965 by Mexican Artist Jorge González Camarena. The mural is 260 m2 in size and highlights the cultural values, ethnicity, and brotherhood of Latin American countries."

Individuals were then asked about their WTP for the *Temporary Exhibitions* alone. Study II provided individuals with the opportunity to change their WTP to ensure that their responses corresponded exclusively to the good under valuation, and that they were not considering their WTP for all goods. The following question was posed:

> *Does this WTP only apply to the Temporary Exhibitions?"* When the answer was NO we repeated the following valuation question: *"Taking into consideration ONLY the Temporary Exhibitions, what is your maximum WTP for this program?*

The same procedure was applied to all other goods under valuation in Studies I and II. Finally, we posed a question to identify the motivations of respondents' who exhibited a positive WTP to determine whether some of such motivations were rooted in securing moral satisfaction.

2.3 Willingness to pay for cultural goods

Given the small sample size employed, we used a Bayesian estimation procedure through which we regressed the WTP declared by individuals against some

[6] We chose to describe the temporary exhibits by highlighting big-named artists since this was meaningful to the interviewees. While we do not expect this to modify the embedding effect, it may have increased the total WTP.

explanatory variables.[7] The Bayesian estimation approach does not rely on asymptotic approximations and provides inferences that are conditional on the data used and that are exact for any sample size[8] (Koop et al. 2007; Lancaster 2004). It has been shown that for a Weibull distribution of a small sample size, a Bayesian estimation performs better than the maximum likelihood estimator (Koop et al. 2007; Smith and Naylor 1987).[9] The density function for WTP is provided by:

$$f(WTP;\lambda,p) = \frac{p}{\lambda}\left(\frac{WTP}{\lambda}\right)^{p-1} e^{-\left(\frac{WTP}{\lambda}\right)}, \quad WTP > 0, \lambda > 0, p > 0 \tag{1}$$

In (1), WTP$=X'\beta$ is the true WTP declared by the individual. This WTP is explained by a set of explanatory variables denoted by X; β is a set of parameters to be estimated; λ is the scale parameter; and p is the shape parameter. Since p is flexible, the Weibull distribution can accommodate several patterns in a WTP distribution. However, depending on the value of this parameter, the final distribution could be different (*i.e.,* $p=1$ will drive the exponential distribution). In summary, the results of the Weibull distribution are more robust due to flexibility in the shape parameter. The mean, median, and variance of this distribution are $\lambda\Gamma(1+1/p)$, $\lambda(\ln(2))^{1/p}$, and $\lambda^2\left[\Gamma(1+2/p) - \Gamma^2(1+1/p)\right]$, respectively. The Bayesian estimation provides estimates of the posterior distribution of the WTP for the good. We provide information of the mean, standard deviation, median, and two quantiles (2.5%, 97.5%) of the simulations.

2.3.1 Hypothesis testing

For hypothesis testing, we followed the Bayesian approach proposed in Woodworth (2004); Appendix B) to compare the credible interval (represented by the 2.5th and 97.5th percentiles of the simulation), and to measure the WTP differences of each sample (WTP1–WTP2), as determined from each simulation of the posterior distributions. When a credible interval contained zero, we found evidence of equality (i.e., WTP1 = WTP2). When a credible interval was always positive, we could conclude that there was evidence for WTP1 > WTP2 and vice versa.

Testing for *scope sensitivity* implies a *diagonal comparison* or a comparison of the posterior distribution of the WTP between the *Pinacoteca* and its parts. That is, we test the following hypothesis:

[7] For readers interested in a full explanation of the advantages and disadvantages of Bayesian estimation, please see Ntzoufras (2011) and Bernardo and Smith (2001).

[8] The analysis of explanatory variables in the Bayesian econometrics approach is analogous to the analysis of those variables in a classical econometric approach. We first tested for homogeneity of the demographic characteristics among treatments, and control for them in the regression analysis. The results of the regressions are available upon request.

[9] Given the censoring at zero of open-ended WTP questions, we tested both the Tobit and Weibull models. To select between these two approaches we compared the Akaike information criterion (AIC), the deviation information criterion (DIC), and the Bayesian information criterion (BIC). We used WinBUGS14 for the estimation.

Table 2 Distribution of WTP for each subsample

Sample	Welfare Measure	Control	Study I			Study II		
		1	2	3	4	5	6	7
Pinacoteca (A)	Mean	10.49						
	S.D.	1.768						
	Median	10.31						
	C.I. 2.5	7.571						
	C.I. 97.5	14.5						
Mural (B)	Mean	4.827	5.913			2.039		
	S.D.	0.785	0.925			0.354		
	Median	4.748	5.82			1.999		
	C.I. 2.5	3.514	4.377			1.463		
	C.I. 97.5	6.584	8.016			2.847		
Exhibitions (C)	Mean	5.197		5.328			5.022	
	S.D.	0.897		0.8829			0.767	
	Median	5.097		5.227			4.944	
	C.I. 2.5	3.725		3.882			3.736	
	C.I. 97.5	7.24		7.339			6.741	
Temporary Exhibitions (D)	Mean	2.42		2.4	7.34		2.692	3.228
	S.D.	0.438		0.449	1.263		0.465	0.58
	Median	2.373		2.345	7.195		2.638	3.16
	C.I. 2.5	1.708		1.688	5.292		1.942	2.3
	C.I. 97.5	3.424		3.437	10.25		3.749	4.556
N		45	51	50	52	50	53	47

Diagonal comparison: Scope sensitivity

(a) A1–B2 ≤ 0; (b) A1–C3 ≤ 0; (c) A1–D4 ≤ 0; and (d) C3–D4 ≤ 0,

where (a), (b), and (c) verify whether the WTP distribution for the *Pinacoteca* derived from survey 1 is less than or equal to the distribution of the WTP for the *Mural* alone, as derived from survey 2; of the WTP distribution for *All Exhibitions,* as derived from survey 3; and of the WTP distribution for *Temporary Exhibitions,* as derived from survey 4, respectively. We refer to this as a *diagonal comparison* since we follow a diagonal path from the matrix of data presented in Table 2 (for both Studies I and II). In Bateman et al. (2006), the value for an inclusive good should not be less than the value of a subset good. In other words, the value for the whole *Pinacoteca* should be higher than the value for the *Mural* or that for *All Exhibitions* or *Temporary Exhibitions* when valued individually. The value for *All Exhibitions* must also be higher than the value for the *Temporary Exhibitions* alone.

For instance, A1–B2 ≤ 0 means that the predicted WTP for the entire *Pinacoteca* is less than or equal to the value for the *Mural* alone. Finally, (d) determines whether the WTP distribution for *All Exhibitions* derived from survey 3 is less than or equal to the WTP distribution identified for the *Temporary Exhibitions* alone from survey 4. Carson and Mitchell (1995) refer to this test format as the *test of component sensitivity*.

Testing for *part–whole effects* implies a *horizontal comparison* or a comparison of the WTP distributions for the same good when it is valued individually compared with the value obtained when the good is valued as part of another more comprehensive good. It is called a horizontal comparison since it compares values listed in the same rows of Table 2. The following comparisons are made:

Horizontal Comparison: part–whole test

(e) B1–B2 ≤ 0; (f) C1–C3 ≤ 0; (g) D1–D3 ≤ ; (h) D1–D4 ≤ 0; and (i) D3– D4 ≤ 0,

where (e) to (h) compare the WTP distributions for the same good. However, for survey 1 the value is derived from the deconstruction of the good's total value among its parts, while the second value is derived from the valuation for only that good from surveys 2, 3, and 4 for the *Mural*, *All Exhibitions,* and the *Temporary Exhibitions,* respectively. The last comparison, (i), shows whether the value for the *Temporary Exhibitions,* valued as a part of *All Exhibitions,* is less than or equal to its value when it is valued alone. This could be interpreted as a *part–whole* anomaly since in survey 1 (column 1) the good was valued with full information of the nested structure. After providing the nested structure, individuals have to value the whole Pinacoteca and then split that value into its components, the *Mural*, *All Exhibitions,* and *Temporary Exhibitions*. In survey 2, the *Mural* was valued alone with no information on the nested structure; in survey 3 *All Exhibitions* were valued alone, and the value was split in its components—*Temporary Exhibitions*; and in survey 4 *Temporary Exhibitions* was valued alone without nested information. Recall that according to KK, we should expect that the lower the position of a good in the embedding structure, the lower is its value. Therefore, the horizontal comparison would suggest an embedding problem when presenting evidence in favor of the horizontal inequality comparison.

For Study II (full disclosure), we conducted the same tests but we used surveys 5 through 7. We tested the diagonal comparisons (i.e., (a) A1–B5 ≤ 0; (b) A1–C6 ≤ 0; (c) A1– D7 ≤ 0; and (d) C6–D7 ≤ 0) and horizontal inequality comparisons (i.e., (e) B1–B5 ≤ 0; (f) C1–C6 ≤ 0; (g) D1–D6 ≤ ; (h) D1–D7 ≤ 0; and (i) D6–D7 ≤ 0).

Both Studies I and II were necessary to verify whether providing more complete information reduces both *scope insensitivity* and the *part–whole* anomaly. If the diagonal comparison tests, (a) through (d), and the horizontal inequality comparisons, (e) through (g), are accepted, this serves as evidence of an anomaly in the CV method. Therefore, if we cannot reject the diagonal and horizontal hypotheses of Study I but reject the diagonal and horizontal hypotheses of Study II, we have evidence that providing more information helps us reduce or eliminate the anomaly.

3 Results and discussion

We were interested in homogenous, independent, and income-stratified subsamples; thus, we used a Chi-squared test to verify that all samples had similar distributions in terms of the variables considered to explain WTP: (1) income, (2) age, (3) education, (4) gender, (5) years living in the city, (6) past visits (a dummy variable taking the value of 1 when a participant had visited the good under analysis), and (7) anticipation of a future visit (dummy variable).

We found p-values of 0.101, 0.945, 0.301, 0.192, and 0.525 for the first five variables. Therefore, we could not reject the hypothesis of sample distribution homogeneity (see Tables 4 and 5 of the appendix for a description of the survey data). We found significant differences between past and future visits, but these differences were expected since we compared different goods. Rather, we should not expect that viewing the *Mural* in the past or thinking about viewing the *Mural* in the future would govern past or future visits to the exhibitions.

We also ran the same tests but for all potential pairwise comparisons. We found differences in income for five of the 20 comparisons made (four of which were at the 10% level of significance and only one at the 5% level) and differences in age only for two (at the 10% and 5% levels). We found that as was expected, most people visited the *Pinacoteca* to see the *Mural*, while fewer people visited the exhibitions. Most importantly, we found no differences between past visits to the same good across the different samples. Thus, a visit to the *Mural* (*Exhibitions* or *Temporary Exhibitions*) as identified from one sample was not significantly different from a visit to the *Mural* (*Exhibitions* or *Temporary Exhibitions*) as identified from another sample. Similar patterns were found for intentions to visit the goods in the future. In conclusion, besides a few differences observed in terms of income and age, we found no other unexpected differences between the samples. We used these explanatory variables as controls in our econometric regressions.

We aimed for our elicitation format (open-ended) and number of observations to be similar to those of previous embedding studies, especially to KK's application. Therefore, if our results differ from those obtained by KK, this cannot be attributed to the use of a larger sample size or of a different elicitation format. Thus, considering our budget constraints, we aimed at making 60 observations per subsample, but after eliminating incomplete surveys, disagreements with the hypothetical scenario, and cases in which individuals of the highest socioeconomic levels declined to participate in interviews, we were left with a different number of observations for each subsample.

The bottom row of Table 2 presents the total number of observations made for each subsample. This small sample size is common among embedding studies. For instance, in their laboratory setting Bateman et al. (2004) make 34 observations on some treatments with a maximum of 43, and Clark and Friesen (2008) make 20 observations with a maximum of 48. We do not claim that this is a good sample size or that it is advisable to use small samples because other researchers have done so, as we simply faced a tight budget and decided to keep the sample small so that our results would be comparable to those of previous studies reporting the EEs.[10]

[10] We do not claim that the EE is exclusive for small samples, as a referee correctly pointed out that there is also evidence of the EE using larger sample sizes. Furthermore, the purpose of this study is to test how the information about the nesting structure could affect the value assigned by the respondents, and we do not mean to use this result in a cost–benefit analysis.

Table 3 Hypothesis testing: distribution of differences for the distribution

Study I						
	Mean	S.D.	2.5%	Median	97.5%	Embedding
Diagonal comparisons						
A1–B2	4.579	1.994	0.979	4.466	8.867	No
A1–C3	5.160	1.965	1.637	5.029	9.374	No
A1–D4	**3.208**	**2.288**	**−0.953**	**3.090**	**8.083**	**Yes**
C3–D4	**−1.934**	**1.339**	**−4.652**	**−1.913**	**0.6492**	**Yes**
Horizontal comparisons						
B1–B2	−1.095	1.226	−3.615	−1.065	1.246	No
C1–C3	−0.152	1.271	−2.700	−0.143	2.354	No
D1–D3	0.021	0.626	−1.241	0.029	1.250	No
D1–D4	**−4.913**	**1.343**	**−7.906**	**−4.794**	**−2.611**	**Yes**
D3–D4	**−4.883**	**1.123**	**−7.311**	**−4.805**	**−2.885**	**Yes**
Study II						
	Mean	S.D.	2.5%	Median	97.5%	Embedding
Diagonal comparisons						
A1–B5	8.467	1.852	5.393	8.262	12.670	No
A1–C6	5.467	1.932	2.102	5.317	9.723	No
A1–D7	7.317	1.855	4.127	7.151	11.420	No
C6–D7	1.830	0.805	0.294	1.809	3.480	No
Horizontal comparisons						
B1–B5	2.788	0.889	1.228	2.727	4.720	No
C1–C6	0.169	1.183	−2.143	0.158	2.559	No
D1–D6	−0.272	0.648	−1.574	−0.269	0.999	No
D1–D7	−0.803	0.720	−2.331	−0.775	0.549	No
D6–D7	−0.511	0.621	−1.791	−0.494	0.664	No

Bold lines present evidence of the embedding effect

Finally, the explanatory variables in the model include a dummy for past visits, a dummy for future visits (whether people anticipated making *future visits to the Pinacoteca)*, *years living in the city* of Concepción, *age, gender,* and *income*.[11]

3.1 Testing for scope sensitivity: Diagonal comparison

Tables 2 and 3 present the distribution of the WTP (i.e., the mean, standard deviation, and 2.5 and 97.5 percentiles) for each subsample and distribution for the hypothesis test. The diagonal test results listed in Table 3 show that the mean value for the *Pinacoteca* (US $10.49) is greater than the value for the *Mural* (H0:A1–B2,

[11] The 12 tables (Table 6) of results are given in the appendix.

US $5.9), with an average difference of US $4.58 and with a confidence interval (CI) for the difference of [0.979–8.867]. This is also true when values for the *Pinacoteca* are compared to those for *All Exhibitions* (H0:A1–C3, US $5.328) with a CI of [1.63, 9.37]. Therefore, we reject the hypothesis of scope insensitivity in these comparisons. However, we cannot reject the hypothesis of scope insensitivity in the comparison between the *Pinacoteca* and the *Temporary Exhibitions* (H0:A1–D4, US $7.34) with a CI of [− 0.953–8.083], and in the comparison between *All Exhibitions* and *Temporary Exhibitions* (H0:C3–D4) with a CI of [− 4.652–0.6492]. Note that in the diagonal comparisons, the CI must always be positive to reject the hypothesis. We consistently found no evidence of scope insensitivity in Study II since all of the CI values are positive.

3.2 Testing for part–whole effect: Horizontal comparison

This hypothesis has two components. First, we may expect the values of the items to be the same, regardless of the nested structure involved. Therefore, if there is no evidence to reject the hypothesis that the same good has the same value in two samples, we reject the hypothesis of *part–whole bias*. However, if they are not equal, KK's hypothesis suggests that the value of the good should be less when it is embedded in a more comprehensive good.

Our CIs [2.5%–97.5%] show no evidence of *part–whole effect* for the *Mural* (B1–B2), *Exhibitions* (C1–C3), or *Temporary Exhibitions* (D1–D3) for samples 2 and 3. All of these CIs include zero. Nevertheless, when we compare results for the *Temporary Exhibitions* of sample 1 (D1) and sample 3 (D3) to the results for the *Temporary Exhibitions* of sample 4 (D4), we find evidence of embedding, where the values are negative and the CIs do not include zero. Again, all CIs considered in Study II include zero, rejecting the possibility of embedding effect. The only exception is the comparison B1–B5, which is always positive, confirming that the value for the *Mural* is higher for sample 1 than it is for sample 5. This was not an expected result and runs completely contrary to the expectation of embedding.

Another result worth mentioning is that the standard deviations of "bigger goods" proved to be significantly greater than the subsets for all diagonal comparisons of Studies I and II. Rather, the standard deviation for the value of the *Pinacoteca* was always greater than the standard deviation of the WTP for other goods valued individually (see Table 2). While we conducted no formal tests, it is interesting to note that all standard deviations of Study II are lower than those of Study I, except in the case of *Temporary Exhibitions*, for which they are valued as part of *All Exhibitions*. Hence, providing more descriptions of the goods and of their relationships reduced variability in the WTP distributions of our samples; however, this may indicate that more time was needed for the interviews, which may have been detrimental if it increased the number of nonresponses. Nonetheless, Table 2 shows that the numbers of protest and no responses were equally distributed among sub-samples.

The average value measured for the *Pinacoteca* is roughly US $10.5, while for the *Mural*, *All Exhibitions,* and *Temporary Exhibitions* the values were US $4.8, US $5.2, and US $2.4, respectively.

According to our results, some goods did not present the EE, showing consistency in their value across samples. In this sense, T*emporary Exhibitions* proved to be prone to the EE in Study I, while in Study II, the results show that providing more information does reduce the EE. In this sense, our results are in line with those showing that following appropriate approaches to CV surveys improves results (Bateman et al. 2004; Bishop 2018; Hausman 2012; Riganti and Scarpa 1998)

Unlike other studies that identify the existence of the EE while not addressing them (Fogarassy et al. 2016; Grammatikopoulou and Olsen 2013; Jørgensen et al. 2013; Tebbe and von Blanckenburg 2018), we show that by providing respondents with more high-quality information it is possible to reduce the EE.

4 Conclusions

In this study, we analyzed how advance disclosure affects both the WTP and the EE using cultural goods as a case study. The valuing of goods subject to different levels of nested structure, such as cultural goods, may be affected by the EE as seen in Study I. For all of the samples studied, the good most prone to presenting some level of embedding was *Temporary Exhibitions*, and this may be attributed to the fact that residents of the city are less familiar with this kind of good.

Our results suggest that even for small samples the level of embedding can be reduced by providing a more complete description of the goods under valuation, as seen in Study II. Therefore, it is of central importance for each CV experiment to test whether enough information is being provided about the goods under analysis to ensure that respondents understand the relationships among them. This involves executing considerably more work when designing a CV study. Although it is obvious that providing more and better information is crucial to generating a meaningful economic result from a CV study, it is always difficult to know when enough information has been provided.

We have shown that at least for the EE, it is possible to identify the amount of information needed to avoid the EE. Even when a researcher is interested in valuing only a subset of the whole good, he/she must provide a description of the nested structure of the good. In some cases, the nested structure is simple or obvious to identify, but in other cases, the nested structure could be more diffused. The main guideline for this problem is that the relevant nested structure should be defined by the main valuation objective of the application. Which information to include depends on the relevance of that information to people's behavior. The relevance is given by the economic relationship between goods.

The consensus in the literature regarding CV is that you should remind interviewers about the existence of relative goods (and the budget constraint) before the valuation question is posed. Defining relative goods is easier if we are thinking about use value, but more complicated if we are thinking about nonuse value, in which case the relative goods are not that clear. Identifying which ones are relative goods is after all, an empirical question that can be solved with the help of the researcher's criterion; but in the end, this needs to be evaluated on a case-by-case basis. Our advice would be for researchers to test the "nested context" in

the focus groups and pilot surveys using different levels of information to capture the possible nested structure and to evaluate if the estimated WTP is sensitive to this definition. This information should be part of the researchers' report regarding empirical strategies in the same way that a standard CV application needs to report the optimal design process used to define the BID vector (Johnston et al. 2017).

Undeniably, there are other issues to consider with regard to design, such as the optimal or minimum sample size, the burden to the interviewees, the available budget, and so on. In other words, our results show that it is not sufficient to report the final results of a CV study; rather, all pretesting steps should be provided to ensure the reader that the main biases identified in the literature have been acknowledged.

We have observed that providing more information significantly reduces the standard deviation of the WTP estimates. This deserves further research to determine whether such is a pattern for these types of studies and whether providing more information might also have negative impacts such as an increasing the number of nonresponses. The presence of embedding is not necessarily an unexpected or erroneous result from an economic perspective due to potential substitution patterns between the different goods under analysis. We assert that even in this case, a stronger description of the good in question may reduce the presence of the EE, thereby providing further support to the claim that individuals must be informed in advance of the nested structure of goods examined, regardless of the specific good they are asked to value.

Finally, a word of caution is relevant here. Our study was designed to evaluate the EE in its most common setting according to the literature, using small sample sizes and open-ended questions; therefore, our results may have been different if we used larger samples and closed-ended questions.

Appendix A

See Tables 4, 5 and 6.

Table 4 Descriptive Statistics (mean and standard deviation)

Variables (mean)	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 7
Income (thousands of Chilean pesos)	478 (381)	466 (401)	493 (304)	474 (397)	319 (280)	434 (330)	404 (356)
Age	45 (17)	42 (17)	45 (18)	44 (18)	43 (16)	45 (17)	45 (17)
% Men (gender)	41%	37%	45%	45%	37%	36%	23%
% Past visits	67%	76%	43%	41%	68%	32%	32%
% Future visits (dummy)	75%	56%	64%	90%	74%	87%	75%
Years living in the city	36 (18)	34 (18)	34 (18)	33 (21)	32 (19)	38 (17)	38 (17)
Sample size	45	51	50	52	50	53	47

Table 5 Distribution of education levels among samples

Variable	Sample 1 (%)	Sample 2 (%)	Sample 3 (%)	Sample 4 (%)	Sample 5 (%)	Sample 6 (%)	Sample 7 (%)
Non formal education	0	0	0	0	0	0	0
Incomplete Primary	4.1	9.3	3.8	1.7	3.7	7.3	1.9
Complete primary	2	3.7	1.9	6.9	3.7	9.1	7.7
Incomplete High school	16.3	13	9.4	6.9	11.1	5.5	13.5
Complete high school	24.5	25.9	24.5	22.4	20.4	25.5	28.8
Incomplete college	22.4	16.7	32.1	31	25.9	21.8	23.1
Complete college	28.6	24.1	26.4	27.6	29.6	29.1	25
Postgraduate	2	7.5	1.9	3.4	5.6	1.7	0
Total	100	100	100	100	100	100	100

Table 6 Econometric regressions*

	Mural 1						Mural 2						Mural 5					
	Beta	sd	2.5%	Median	97.5%	Pr	Beta	SD	2.5%	Median	97.5%	Pr	Eta	SD	2.5%	Median	97.5%	Pr
Constant	−0.0392	0.5270	−1.0550	−0.0539	1.0400	0.4580	1.8380	0.4849	0.9166	1.8220	2.8320	0.9999	0.2241	0.8170	−1.3790	0.2221	1.8580	0.6124
Past visit	−0.0225	0.3888	−0.8088	−0.0175	0.7295	0.4808	−0.7039	0.4385	−1.6100	−0.6869	0.1201	0.0477	−0.3088	0.3946	−1.0870	−0.3098	0.4669	0.2147
Future visit	1.1850	0.4217	0.3202	1.1990	1.9800	0.9949	−0.2943	0.3276	−0.9361	−0.2948	0.3512	0.1801	−0.1571	0.4423	−1.0420	−0.1470	0.6792	0.3672
Years living in the city	0.0064	0.0144	−0.0230	0.0067	0.0336	0.6819	0.0069	0.0140	−0.0223	0.0074	0.0331	0.7038	0.0118	0.0124	−0.0139	0.0122	0.0352	0.8350
Age	−0.0112	0.0157	−0.0410	−0.0115	0.0204	0.2348	−0.0026	0.0129	−0.0260	−0.0033	0.0249	0.4003	−0.0072	0.0161	−0.0382	−0.0077	0.0253	0.3157
gender	0.1327	0.3391	−0.5371	0.1322	0.7957	0.6592	−0.3328	0.3246	−0.9619	−0.3374	0.3178	0.1508	0.4680	0.3698	−0.2465	0.4655	1.2000	0.8993
Income	0.1995	0.0499	0.1039	0.1985	0.2994	1.0000	0.1281	0.0434	0.0424	0.1284	0.2134	0.9987	0.1728	0.0645	0.0525	0.1703	0.3064	0.9982
	Exhibitions 1						Exhibitions 3						Exhibitions 6					
	Beta	sd	2.5%	Median	97.5%	Pr	Beta	SD	2.5%	Median	97.5%	Pr	Beta	SD	2.5%	Median	97.5%	Pr
Constant	0.0393	0.6483	−1.2100	0.0298	1.3510	0.5186	1.3620	0.6412	0.1579	1.3460	2.6800	0.9863	0.3804	0.7493	−1.1230	0.3967	1.8240	0.7026
Past visit	0.0889	0.4985	−0.8924	0.0882	1.0700	0.5700	0.4465	0.3538	−0.2492	0.4500	1.1390	0.8961	0.4301	0.3228	−0.1846	0.4221	1.0830	0.9130
Future visit	1.2040	0.4342	0.3360	1.2150	2.0370	0.9961	0.2466	0.3836	−0.5156	0.2472	0.9897	0.7467	1.1990	0.4889	0.1419	1.2330	2.0680	0.9845
Years living in the city	0.0141	0.0170	−0.0197	0.0144	0.0471	0.7997	−0.0018	0.0155	−0.0336	−0.0014	0.0274	0.4633	−0.0138	0.0126	−0.0400	−0.0131	0.0093	0.1309
Age	−0.0213	0.0175	−0.0546	−0.0218	0.0141	0.1169	−0.0002	0.0136	−0.0265	−0.0006	0.0278	0.4813	0.0105	0.0147	−0.0170	0.0100	0.0414	0.7618
Gender	0.2545	0.4005	−0.5206	0.2484	1.0610	0.7391	−0.0444	0.3442	−0.7177	−0.0453	0.6403	0.4456	−0.2736	0.3137	−0.8880	−0.2750	0.3413	0.1891

Table 6 (continued)

	Exhibitions 1						Exhibitions 3						Exhibitions 6					
	Beta	sd	2.5%	Median	97.5%	Pr	Beta	SD	2.5%	Median	97.5%	Pr	Beta	SD	2.5%	Median	97.5%	Pr
Income	0.1736	0.0669	0.0429	0.1726	0.3061	0.9959	0.0159	0.0219	−0.0199	0.0133	0.0657	0.7607	0.0242	0.0425	−0.0543	0.0225	0.1123	0.7044
	Temporary Exhibitions 1						Temporary Exhibitions 4						Temporary Exhibitions 7					
	Beta	SD	2.5%	Median	97.5%	Pr	Beta	SD	2.5%	Median	97.5%	Pr	Beta	SD	2.5%	Median	97.5%	Pr
Constant	−0.7445	0.6877	−2.0660	−0.7539	0.6163	0.1371	2.8230	0.7813	1.3870	2.8030	4.4410	0.9999	0.4749	0.8301	−1.0850	0.4562	2.2080	0.7153
Past visit	0.2630	0.5242	−0.7586	0.2592	1.2980	0.6918	0.0448	0.3381	−0.6112	0.0426	0.7214	0.5516	−0.3750	0.3985	−1.1470	−0.3864	0.4325	0.1723
Future visit	1.2290	0.4885	0.2352	1.2380	2.1650	0.9908	−0.7580	0.6091	−2.0460	−0.7234	0.3300	0.0972	0.9090	0.4678	−0.0293	0.9269	1.7830	0.9714
Years living in the city	0.0097	0.0165	−0.0241	0.0103	0.0409	0.7328	0.0058	0.0134	−0.0210	0.0061	0.0317	0.6697	−0.0026	0.0150	−0.0328	−0.0023	0.0264	0.4351
Age	−0.0196	0.0179	−0.0522	−0.0205	0.0176	0.1406	−0.0206	0.0130	−0.0451	−0.0210	0.0060	0.0629	−0.0121	0.0167	−0.0443	−0.0122	0.0214	0.2295
Gender	0.2848	0.4024	−0.4975	0.2796	1.0870	0.7642	0.1378	0.3560	−0.5639	0.1384	0.8369	0.6542	0.6698	0.4507	−0.1673	0.6523	1.5930	0.9392
Income	0.1783	0.0563	0.0718	0.1766	0.2941	0.9992	0.0938	0.0417	0.0152	0.0926	0.1783	0.9901	0.1218	0.0614	0.0062	0.1205	0.2460	0.9806
	Temporary Exhibitions 3						Temporary Exhibitions 6						Pinacoteca					
	Beta	SD	2.5%	Median	97.5%	Pr	Beta	SD	2.5%	Median	97.5%	Pr	Beta	SD	2.5%	Median	97.5%	Pr
Constant	0.5566	0.6339	−0.6361	0.5413	1.8210	0.8074	−0.7125	0.7507	−2.0990	−0.7425	0.8501	0.1674	0.6818	0.5905	−0.4364	0.6611	1.8680	0.8804
Past visit	0.1392	0.4063	−0.6654	0.1442	0.9364	0.6424	0.3261	0.3249	−0.2969	0.3216	0.9861	0.8430	−0.0763	0.4073	−0.8880	−0.0682	0.6916	0.4324
Future visit	0.0661	0.3645	−0.6586	0.0723	0.7752	0.5783	1.3170	0.5332	0.1274	1.3610	2.2520	0.9833	1.2110	0.4293	0.3398	1.2220	2.0230	0.9965

Table 6 (continued)

	Temporary Exhibitions 3						Temporary Exhibitions 6						Pinacoteca					
	Beta	SD	2.5%	Median	97.5%	Pr	Beta	SD	2.5%	Median	97.5%	Pr	Beta	SD	2.5%	Median	97.5%	Pr
Years living in the city	−0.0015	0.0119	−0.0259	−0.0013	0.0214	0.4514	−0.0066	0.0125	−0.0322	−0.0063	0.0167	0.2998	0.0127	0.0151	−0.0183	0.0130	0.0415	0.8055
Age	−0.0063	0.0117	−0.0283	−0.0066	0.0180	0.2796	0.0125	0.0150	−0.0159	0.0120	0.0431	0.8013	−0.0189	0.0165	−0.0506	−0.0194	0.0151	0.1224
Gender	−0.1661	0.3468	−0.8596	−0.1654	0.5060	0.3134	−0.2251	0.3204	−0.8493	−0.2271	0.4184	0.2333	0.2495	0.3748	−0.4683	0.2457	0.9982	0.7473
Income	0.1157	0.0617	0.0001	0.1141	0.2429	0.9751	0.0267	0.0419	−0.0522	0.0253	0.1129	0.7340	0.1993	0.0526	0.0996	0.1979	0.3062	0.9998

*For testing the significance of the parameter we used the CI following the interpretation given by *Ioannis Ntzoufras. (2009) Bayesian Modeling Using WinBUGS, John Wiley & Sons,* INC. Chap. 5.2.3. *The Pr indicates whether the association is positive (Pr = 1) or negative (Pr = 0)*

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