Determinants of the willingness to pay and willingness to accept in the valuation of informal care. The CUIDARSE study

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Abstract

Purpose – This paper aims to study the value of informal care (IC) time from the perspective of caregivers using two alternative contingent valuation tools – willingness to pay (WTP) and willingness to accept (WTA) – and to identify the variables that affect the stated values.

Design/methodology/approach – The authors used data from a multi-centre study of 610 adult caregivers conducted in two Spanish regions in 2013. The existence of "protest zeros" and "economic zeros" because of the severe budgetary constraints of the households was also considered. Two-part multivariate models were used to analyse the main factors that explained the declared values of WTA and WTP.

Findings – The average WTP and WTA were €3.12 and €5.98 per hour of care, respectively (€3.2 and €6.3 when estimated values for "protest zeros" and "economic zeros" were considered). Some explanatory variables of WTA and WTP are coincident (place of residence and intensity of care time), whereas other variables only help to explain WTP values (household and negative coping with caregiving) or WTA values (age and burden of care). Some nuances are also identified when comparing the results obtained without protest and economic zeros with the estimated values of these special zeros.

Originality/value – Studies analysing the determinants of WTP and WTA in IC settings are very scarce. This paper seeks to provide information to fill this gap. The results indicate that the variables that explain the

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value of IC from one perspective may differ from the variables that explain it from an alternative perspective. Given the relevance of contextual factors, studies on the topic should be expanded, and care should be taken with the extrapolation of results across countries and settings.

Keywords Contingent valuation, Informal care, WTA, WTP, Spain

Paper type Research paper

1. Introduction

Unlike health services, long-term care has the specific characteristic of being in "fragmented territory" between the family, on the one hand, and the providers of professional services, financed publicly and privately, on the other.

Informal care (IC) is an asset of extraordinary value, without which long-term care systems would be difficult to sustain (Saltman *et al.*, 2006; Fernandez *et al.*, 2009; Colombo *et al.*, 2011; Carrera *et al.*, 2013; Peña-Longobardo and Oliva-Moreno, 2022). According to Van den Berg *et al.* (2004), IC is a nonmarket composite commodity consisting of heterogeneous parts produced (paid or unpaid) by one or more members of the social environment of the care recipient as a result of the care demands of the care recipient. Although the definition of IC varies over time and between societies, there are a number of characteristics that differentiate it from professional care. IC (also called "family care" or "non-professional care") is usually provided by close relatives, friends or neighbours. Besides, on many occasions, the caregiver has not received specific training for the provision of care, which encompasses a wide range of activities related to basic and instrumental activities for daily life, including affective and emotional support. Caregivers may receive aid or economic benefits, but there exists no employment relationship where rights such as limited hours of care per week or the right to vacation are recognized (Triantafillou *et al.*, 2010).

Throughout the cost-of-illness literature, IC has a very considerable weight in the economic impact of a disease or injury when societal perspective is considered. Thus, it is well documented that, in the case of rare diseases (López-Bastida *et al.*, 2016), dementia (Luengo-Fernandez *et al.*, 2011), brain diseases (Gustavsson *et al.*, 2011), multiple sclerosis (Ernstsson *et al.*, 2016; Rasmussen *et al.*, 2017) and mental illnesses (Oliva-Moreno *et al.*, 2009), IC costs can be as high as or superior to health-care costs.

Revealed preference methods, particularly the opportunity-cost method and the replacement-cost method, are the most common techniques for assessing care time (Van den Berg *et al.*, 2004; Hoefman *et al.*, 2013). Contingent valuation (CV) techniques are routinely applied in other areas of economic evaluation, such as environmental economics or transport economics, although in the field of IC valuation, they are used much less than revealed preference techniques (Oliva-Moreno *et al.*, 2017). CV techniques are stated preference methods that reveal people's willingness to pay for (WTP) or willingness to accept (WTA) the inclusion or exclusion of a new or improved service, such as a GP consultation and a new program/intervention to improve their quality of life, that enhances their health. In IC scenarios (Rotteveel *et al.*, 2020; van den Berg *et al.*, 2005; de Meijer *et al.*, 2010; Chiwaula *et al.*, 2016), it is common to propose assessments that consider the WTA for an intervention that meant having to provide an additional hour of IC or the WTP for an intervention that reduced the provision of IC by 1 h.

Although traditional models postulate that the differences between the values obtained from the elicitation of the WTP and the WTA should be small, numerous empirical studies indicate significant differences between these observed values (Knetsch and Sinden, 1984; Brown and Gregory, 1999; Horowitz and McConnell, 2002; Sayman and Öncüler, 2005; Tunçel and Hammitt, 2014). In the field of evaluating IC time, although there are some

studies that have applied both types of contingent evaluation techniques, there are fewer studies that have analysed which variables are associated with the observed values.

The objective of this work is to deepen this knowledge by observing the WTP and WTA for an hour of IC in a Spanish population of caregivers and to analyse the determinants of the values obtained.

2. Literature review

CV elicitation methods have been widely used in fields of economics such as transport economics or environmental economics, but studies that compare the valuation of health care services carried out by measuring both WTP and WTA are scarcer. The most comprehensive review is the meta-analysis by Tunçel and Hammitt (2014). These authors estimated a WTA/WTP ratio of 3.28. This meta-analysis collects data from studies of very different goods and services, but no disaggregated information by type of goods/service was shown. Nevertheless, recently, the first systematic review of the WTA–WTP disparity in the health domain was published (Rotteveel *et al.*, 2020). In this review, the authors identified 13 papers reporting estimates of WTA and WTP from 19 experiments/subgroups. These authors estimated that the WTA/WTP ratio oscillates in the range from 0.60 to 4.01, with means of 1.73 (median 1.31) for 15 estimates of the mean and 1.58 (median 1.00) for 9 estimates of the median. The authors conducted an analysis with individual microdata provided by the authors of six studies, obtaining a WTA/WTP ratio that ranged from 1.86 (unadjusted) to 1.7 (adjusted for age, sex and income). The usual finding reported in the studies identified is that WTA values are well above WTP values. The only exception to this common pattern is in the work performed by Caplan *et al.* (2016), where the opposite tendency was recorded (i.e. WTP was greater than WTA).

3. Theoretical framework

We assume hereafter the theoretical model of informal caregiving stated by van den Berg, Bleichrodt and Eeckhoudt (2005). These authors developed that theoretical model to test the feasibility of using CV to value IC, just like the method used in this paper to estimate the value of IC from caregivers' perspectives.

As is well known, the contingent valuation method (CVM) is a survey-based approach rooted in applied welfare economics used to assign a monetary value to non-market goods such as, for example, IC (Mitchell and Carson, 1989; van den Berg *et al.*, 2005). The CVM is based on the work of Hicks (1943), who described compensated demand curves and the possibility of valuing welfare-changing events by determining the compensating change in income that would keep utility constant. Such valuations are referred to as compensating variations (CVs).

In our framework, we assume that the informal caregiver derives utility from consumption (C_{ic}), his/her own health (h_{ic}) and the health of the patient (h_p). The patient may receive both formal care (FC) and IC. The informal caregiver's utility becomes:

$$U^{ic} = U^{ic}\left(c_{ic}, h_{ic}(IC), h_p(IC, FC)\right) \tag{1}$$

where U^{ic} is the caregiver's utility function.

The informal caregiver has initial wealth W_{ic} and can earn labour income at wage rate r. The amount of time the informal caregiver can work depends on the amount of IC he/she provides, assuming that there is no joint production between paid work and providing informal care. The informal caregiver's budget constraint then becomes:

$$W_{ic} + r(1 - IC) = c_{ic} \tag{2}$$

Substitution of (2) into (1) gives:

$$U^{ic} = U^{ic}\left(W_{ic} + r(1 - IC), h_{ic}(IC), h_p(IC, FC)\right) \tag{3}$$

As is obvious, it is possible that the informal caregiver has no paid job, in which case the budget constraint reduces to $W_{ic}{=}c_{ic}$ This does not mean, however, that informal caregivers are not willing to pay for a reduction in the amount of IC they provide, because the opportunity cost of time spent in providing IC depends not only on the foregone working time but also on the foregone leisure time, so informal caregivers may think that they provide more IC than they consider optimal.

We can now determine the informal caregiver's WTP for a decrease in the amount of IC, defined as the maximum amount of wealth caregivers are willing to give up for a decrease in the amount of IC that they provide. This maximum WTP is the CV for the welfare gain (CVG) derived from such a reduction that returns caregivers to their original utility level. Therefore, we seek to determine the amount CVG that equals:

$$\begin{aligned} &U^{ic}\left(W_{ic} - CVG + r(1 - IC - \delta), h_{ic}(IC - \delta), h_p(IC - \delta, FC)\right) \\ &= U^{ic}\left(W_{ic} + r(1 - IC), h_{ic}(IC), h_p(IC, FC)\right) \end{aligned} \tag{4}$$

Similarly, we can determine the informal caregiver's WTA to provide additional time of IC, defined as the minimum amount of wealth caregivers are willing to accept to compensate them for the welfare loss (CVL) caused by such an increment. Thus, we seek to determine the amount of CVL that equals:

$$\begin{aligned} &U^{ic}\left(W_{ic} + CVL + r(1 - IC + \delta), h_{ic}(IC + \delta), h_p(IC + \delta, FC)\right) \\ &= U^{ic}\left(W_{ic} + r(1 - IC), h_{ic}(IC), h_p(IC, FC)\right) \end{aligned} \tag{5}$$

Although, in principle, we should not expect large deviations between WTP and WTA for the same good or service (Hammitt, 2015; Kim *et al.*, 2015), the existing literature, including that on IC, alerts us to the fact that the differences between the two values can be considerable. The main justifications for these differences are presented in the Section 6 once our results have been shown.

4. Data and empirical methods

The data are from a cross-sectional epidemiological study carried out in a caregiver population in two geographical areas of Spain (Andalusia – southern region of Spain, and Gipuzkoa in the Basque Country – northern region of Spain). These data correspond to the first wave of studies conducted within the multicentre longitudinal CUIDARSE, collected in 2013. The main objective of this study was to analyse the health-related quality of life (HRQoL) among informal male and female caregivers in these two provinces.

Face-to-face interviews were held with 610 caregivers using an *ad hoc* structured questionnaire designed based on previous research. The questionnaire was previously tested in a total of 19 interviews (10 in Guipúzkoa and 9 in Granada). A more detailed description of the study can be found in other published studies (del Río Lozano *et al.*, 2017; Oliva-Moreno *et al.*, 2019; García-Mochón *et al.*, 2019; Peña-Longobardo *et al.*, 2021). The study population were

people aged ≥18 years living or not with a dependent person to whom they provide IC and were registered as caregivers in the Primary Care District of Granada (Andalusia) or in the Social Services of the Provincial Council of Gipuzkoa (Basque Country). Both provinces are different in terms of care provision, according to the involvement of the family and the state. Andalusia is characterized by the supremacy of the family as the main caregiver and public support focused on financial benefits, while the Basque Country has a high proportion of social protection services and a high participation of the domestic market (Martinez, 2011).

The caregivers selected to participate in the study were identified using a three-stage cluster random sampling approach in which municipalities were established as primary units, census sectors within these municipalities as secondary units, and caregivers as final units. Municipalities were stratified by size. The response rate was 82.6% and 72.8% in Granada and Gipuzkoa, respectively.

The questionnaire includes the following variables:

- caregiver characteristics such as gender, age (older ≥65 years, middle 50–64 years and young <50 years), place of residence (Granada and Gipuzkoa), household income – adjusted by household size and composition by OECD modified scale, classified into three groups: low (<€1,000 a month), average (€1,000–€1,500 a month) and high (>€1,500 a month); HRQoL measured through the EQ5D-5L index, ranging from 0 to 1; and dichotomized into high HRQoL when the score was >0.85;
- characteristics of caregiving, for instance, years of providing care and the performance of ungratifying personal care tasks, defined in our study as having to change diapers;
- perceived social support (measured using the Duke-UNC-11 (Broadhead *et al.*, 1988), considering it high for a Duke-UNE score of between 11 and >32);
- use of long-term care services (allowances, day centers, nursing homes, telecare, home care, nursing services and support and training);
- negative coping with caregiving (classified as 1 if the caregiver refused to believe that caregiving was happening and 0 otherwise); and
- caregiver burden, using the Zarit scale, which is a 22-item questionnaire designed to assess how caregivers feel while providing care (Martín *et al.*, 1996).

The total possible score of the scale ranges from 22 to 110 points, and severe burden was classified with a score of 55 or higher.

The project was approved by the Biomedical Research Ethics Committee of Andalusia, and the Provincial Council of Gipuzkoa approved access to the necessary databases and registries.

4.1 Method of valuing informal caregiving

We developed a hypothetical market scenario using a CV framework. The objective of this technique is to present a reliable scenario for the caregivers to reveal their WTP and their WTA the implementation of (or withdrawal from) a programme that changes the number of hours of care provided. The WTP and the WTA were established by means of questionnaires specifically designed for this purpose (Garrido-García *et al.*, 2015).

The WTA for the provision of an additional daily hour of attention to a person already cared for was considered in a hypothetical scenario in which the public insurer could offer financial compensation in exchange for that added time. Likewise, the WTP to reduce the amount of IC provided by 1 h is posed through a hypothetical scenario in which the public

insurer would provide the assistance of a professional caregiver for the care of a person who was already cared for, but, in return, the carer would have to accept a cost-sharing scheme (co-payment).

The elicitation question used to elicit both WTA and WTP estimates consisted of a set of cards, each one representing a different amount of money in euros per hour a day: 0, 1, 2, 3, 4, 5, 6, 8, 10, 12 or 15. To help respondents be conscious of their budget constraints, monthly equivalent amounts were also shown (e.g. €30 a month for €1 a day, €60 a month for €2 a day and so on). The amounts selected as payment cards were already used by Garrido-García *et al.* (2015) to elicit WTA estimates for IC. Our study extends their use to elicit WTP values as well. The pre-test conducted previously to that the final survey was to check the feasibility of the entire questionnaire and verify the suitability of the monetary amounts presented to respondents. Results of the pre-test supported useing the same set of cards for the two types of questions, WTA and WTP.

The way the set of payment cards was administered was analogous to the routine already used by Garrido-García *et al.* (2015), which mimics that applied by Carhty *et al.* (1998) to elicit WTA and WTP in the context of road injuries. The cards were shuffled and subsequently presented to the respondents. Therefore, although all participants were faced with the same number of cards and the same sums in each WTA and WTP question, the order of appearance and the type of scenario varied randomly between questions and respondents.

In the WTA scenario, for each payment card, respondents had to choose one of the following options: "It would be definitely high enough"; "It would be definitely not high enough"; or "I am not sure whether it would be high enough or not". This method produced an interval defined by the lowest amount that would definitely be high enough to compensate respondents and the highest sum that it would not be high enough for sure. An open-ended question was asked about the amount they would accept as compensation within the range. In a follow-up question, respondents who stated that €15 – that is, the highest amount of money – would definitely not be high enough were directly asked to specify the minimum amount of money they would require. Conversely, those who stated that €0 – that is, the lowest sum – would be definitely high enough were subsequently asked why they needed no monetary compensation at all.

A similar procedure was used to derive WTP values. In this case, respondents had to state, for each amount, if they would pay it for sure, if they would not pay it for sure, or if they were not sure whether they would pay or not. Now the elicitation procedure produced an interval defined by the highest amount that they would pay for sure and the lowest amount that they would not pay for sure. Respondents who stated that they would pay €15 for sure were asked to state the maximum sum of money they would be willing to pay. The same as before, respondents who stated that they did not pay any amount at all were asked for the reason of their response.

We also identified the existence of "protest zeros" and "economic zeros", which were because of severe budgetary constraints. In these cases, although the response is zero, this does not mean that the real value that the respondent assigns to 1 h of care is zero. More precisely, zero values considered as true values were those classified as such for the following reasons: "Caring for that person for one hour more per day would not make such a big difference that it would need to be paid for" (WTA), or "taking care of that person for one more hour per day would not be an important difference, so I would be indifferent as to whether a professional caregiver came or not" (WTP). By contrast, when the response was justified for one of the following reasons: "It is a matter of principle – I would feel bad accepting money in exchange for caring for that person" (WTA); "It is a matter of

principle – I would not pay a single euro for a public service" or "I do not trust professional caregivers" (WTP), the valuation was considered a "zero protest", because these answers denote rejection of, or protest against, the proposed scenario because of ethical objections. Furthermore, we also identified the existence of "economic zero". This relates to a situation in which, in a CV scenario, the person surveyed gives an assessment that is not what they really think because they have a severe budget constraint (financial difficulties). These responses were identified when caregivers affirmed that they would pay zero euros because, financially, they could not afford to pay for a reduction of one caregiving hour.

The analyses have been carried out, firstly, excluding protest and economic zeros because it cannot be assumed that the real value to carers of their time is zero in these cases. This affects 42 responses for WTA and 33 responses for WTP. However, although the number of protests and economic zeros is not very high, the exclusion of such responses may lead to a selection bias affecting the results of the analysis (Haab, 1999; Dziegielewska and Mendelsohn, 2007; Ramajo-Hernández and del Saz-Salazar, 2012). For this reason, a complementary analysis was performed, in which protest and economic zeros were recorded, taking into account predicted values for WTA or WTP. These values were predicted by controlling for age, educational level and place of residence. The small sample size of the protest and economic zeros discouraged the use of a greater number of control variables.

4.2 Empirical analysis

One of the main challenges when studying WTP or WTA is the large proportion of values reported as equal to zero (see histograms in the Appendix). This might lead to biased and not very robust results if standard ordinary least squares are applied (Buntin and Zaslavsky, 2004). First, because individuals who respond with zeros might differ greatly from individuals who respond with positive figures, and secondly, because the mechanism that determines zero WTP or WTA may not be the same as the mechanism determining positive responses (Deb and Burgess, 2003). In this context, the two-part models are the most accurate tools (Washington and Mullahy, 1998) as they provide one approach to account for the mass of zeros. In the two-part model, a binary choice model is fit for the probability of observing a positive-versus-zero outcome. Then, conditional on a positive outcome, an appropriate regression model is fit for the positive outcome (Belotti *et al.*, 2015). By using this methodology, the zeros and nonzeros can be generated by different densities as a special type of mixture model. Additionally, they allow for heteroscedasticity, providing consistent estimates, and estimating on entire sample-zeros poses no problem for fitting models (Manning *et al.*, 2005; Blough *et al.*, 1999).

In our case, the first part of the model analysed the probability of incurring a positive WTP or WTA, while the second part of the model studied the level of WTP/WTA for those incurring a positive WTP or WTA. The variables used for both types of models – WTP and WTA – were selected as those whose goodness of fit was the best.

The first part of the model can be described as follows:

$$\Pr(y > 0|x)$$

where the following probit regression model is defined:

$$y^* = \beta' X + \varepsilon$$

where y* is not observed; the observation mechanism "y" would be "1" if WTP or WTA is equal to 0, and "y" would be "0" otherwise. If WTP or WTA > 0, X represents a vector of explanatory variables, β is a vector of the parameters and ε is the standard error. More particularly, the functional models were as follows:

$$Prob_{iWTA} = \beta_0 + \beta_1 middlehighage_i + \beta_2 highage_i + \beta_3 female_i + \beta_4 primarystudies_i + \beta_5 secondarystudies_i + \beta_6 Granada_i + \beta_7 severeburdeni + \beta_8 high\ intensity\ of\ caregivingi + \beta_9 social\ supporti + \beta_{10} highHRQoLi + u_i$$

$$Prob_{iWTP} = \beta_0 + \beta_1 middlehighage_i + \beta_2 highage_i + \beta_3 female_i + mediumincome + \beta_5 highincome + \beta_6 Granada_i + \beta_7 severeburdeni + \beta_8 high\ intensity\ of\ caregivingi + \beta_9 social\ supporti + \beta_{10} formalservicesi + \beta_{11} copingi + u_i$$

For the second part of the model, ordered probabilistic regression models were applied. Depending on the distribution of the WTP provided, the dependent variable was classified in one of three different categories: "high" if the WTP per hour was more than €10; "medium" if the WTP ranged between €2 and €10; and "low" if the WTP was lower than €2/h. In the case of WTA, the categories were as follows: "high" if the WTA per hour was more than €15; "medium" if the WTA ranged between €5 and €15; and "low" if the WTA was lower than €5/h. The selection of these category cut-offs was chosen based on the distribution of the variables. The cut-off points were modified to observe the sensitivity of the results to alternative cut-off points. There were no relevant changes in statistical significance or in the marginal effect of the selected variables.

More precisely, the specification of the model was as follows:

$$Prob_i(WTP/WTAj) = \Lambda\left(\alpha_1 - \beta_1' X_i - \varepsilon_i\right)$$

$$\text{prob}_i(WTP/WTAj) = \Lambda\left(\alpha_j - \beta_j' X_i\right) - \Lambda\left(\alpha_{j-1} - \beta_{j-1}' X_i\right) - \varepsilon_i,$$

$$j = 2, \ldots, j-1 prob_i(WTP/WTAj) = 1 - \sum_{j=1}^{j-1} prob_i(WTP/WTAj)$$

where prob_i (WTP/WTA$_j$) is the probability that subject i (i = 1, …, I) belongs to the category of WTP or WTA that takes values j = 1, 2 and 3; Λ denotes the logistic distribution function; X_i represents the vector of explanatory variables, which are age, gender, educational level, region, severe burden, intensity of caregiving, the way of coping with the care, social support, formal services at home and household income; β is the vector of coefficient parameters assigned to each explanatory variable included in the vector X; and ε_i is the standard error.

As the explanatory variables for estimating WTA and WTP do not have to be the same, the extended specification of the model for WTA is the following:

$$WTAi = \beta_0 + \beta_1 middlehighage_i + \beta_2 highage_i + \beta_3 female_i + \beta_4 primarystudies_i + \beta_5 secondarystudies_i + \beta_6 Granada_i + \beta_7 risk\ of\ burnouti + \beta_8 high\ intensity\ of\ caregivingi + \beta_9 social\ supporti + u_i$$

The extended specification of the model for WTP is the following:

$$WTPi = \beta_0 + \beta_1 middlehighage_i + \beta_2 highage_i + \beta_3 female_i + \beta_4 mediumincome + \beta_5 highincome + \beta_6 Granada_i + \beta_7 risk\ of\ burnouti + \beta_8 high\ intensity\ of\ caregivingi + \beta_9 social\ supporti + \beta_{10} formalservicesi + \beta_{11} copingi + \beta_{12} highHRQoLi + u_i$$

Several tests on multicollinearity problems were performed so as to ensure the robustness of the estimations. All the estimations were also carried out considering the recodification of protest zero and economic zero to show whether the variables associated with both WTP and WTA differ.

5. Results

Table 1 shows the main sociodemographic characteristics of the interviewed caregivers. More than 56% of the caregivers were female, and the average age was close to 60 years. A total of 40% of carers had no studies completed, 26% had primary education and 34% had secondary or tertiary education. Average HRQol was high (0.83 over 1). More than 85% of individuals who received care had social services at home, 17% received services out of home and more than 79% had some type of monetary benefit. A total of 88% of them cared for individuals with severe or major dependence, and almost 5% coped negatively with the care provided. Finally, carers reported a high intensity in the number of caregiving hours provided (117 h per week).

.	Total ($n = 610$)
	Average (SD) or %
Gender (female)	56.56
Age	59.82 (14.47)
Education	
No studies completed	40.07
Primary education	25.94
Secondary/tertiary education	33.99
Level of dependence	
Moderate	12.24
Severe	57.34
Major	30.42
HRQoL	0.827 (0.194)
Granada	51.31
Formal services	
Services at home	85.74
Services out of home	17.38
Monetary benefits	79.51
Other services	66.56
Coping with caregiving (negative)	4.92
Weekly time of informal care reported	117.10 (42.13)

Source: Authors' own elaboration

Table 1. Sociodemographic characteristics of caregivers

The average WTP for a reduction of 1 h of caregiving was €3.12 per hour (€3.20/h when economic and protest zeros were recoded), while the WTA for an increase of one caregiving hour was €5.98 (€6.30 when the protest zeros were recorded) (Table 1). So, the ratio WTA/WTP was 1.92 (1.97 when estimated values of economic and protest zero were considered). Differences were also found depending on gender, place of residence, income, education and health-related quality of life (see Table 2).

The results obtained from the analysis of the main factors associated with the WTA and WTP reported are described in Tables 3 and 4 (Panels a and b). Although in general terms there are no major differences between the inclusion of the estimated values of protest and economic zeros and their exclusion, the loss of significance of some variables or the addition of others introduces nuances in the interpretation of the results that make it advisable to estimate with and without the values of these special "zeros".

When "zero protest" responses are not considered (Panel a), age, province of residence, having severe burdening and intensity of caregiving are the variables that mainly explain the probability of reporting zero WTA (first part model). More precisely, the older respondents had a higher probability (14.6 pp) of reporting a WTA equal to zero than the younger ones. Furthermore, those living in Granada had a lower probability (15.8 pp) of reporting a zero WTA than those living in Gipuzkoa. Having severe burdening and a high intensity of caregiving were associated with a lower probability of 15.9 pp and a higher probability of 14.3 pp of zero WTA, respectively. When WTA is positive (second part model), the factors that explain its extent are place of residence and education. Specifically, caregivers living in Granada had a 14.5 pp higher probability of reporting a WTA higher than €15/h (Table 3). Having received tertiary education was associated with more WTA (9.1 pp) than having no education. When "zero protest" responses are considered and replaced by their estimated values, small differences in the explanatory variables are observed. Thus, the coefficient of the variable representing high caregiving hours takes a higher value in the first part of the model (0.171 vs 0.143), while the other coefficients of the significant variables are slightly reduced. In the second part of the model, the variable representing higher education ceases to be significant and the variable representing high perceived social support becomes significant instead.

Regarding factors related to WTP, place of residence, the way of coping with the care, FC services received at home and household income were statistically significant variables (Table 4, Panels a and b). When "zero protest" and "economic zero" responses are not considered (Panel a), those who received FC services at home had a 22.1 pp higher probability of reporting a WTP of zero (first part model). By contrast, those who cope negatively with caring had a 22.3 pp lower probability of reporting a WTP of zero. Medium household income entailed a lower probability of having zero WTP (12.7 pp) compared to low-income households. Caregivers living in Granada had a higher probability of reporting a WTP of zero (a 19.0 pp higher probability). The variables associated with a high level of WTP (second part model) were the intensity of caregiving (a higher intensity of caregiving resulted in a 14.2 pp higher probability of reporting more WTP), households with high incomes, in which caregivers had a 19.2 pp higher probability of reporting WTP more than €10/h, and caregivers who lived in Granada had a 16.2 pp lower probability of reporting a high WTP. When "zero protest" and "economic zero" responses are considered and replaced by their estimated values (Table 4, Panel b) to receive FC services at home, medium household income variables are no longer significant (first part model). In the second part of the model, the significant variables are the same as in the estimation that does not consider the protest and economic zeros (high household income, high intensity of care, time and living in Granada), although the value of the coefficients is slightly lower.

Table 2.
WTP and WTA description by sociodemographic characteristics

	WTP ($n = 521$)	Comparison of means p-value	WTP (including predicted values for economic zeros) ($n = 554$)	WTA ($n = 529$)	Comparison of means p-value	WTA (including predicted values for protest zeros) ($n = 571$)
General	3.118 (5.123)		3.196 (5.014)	5.983 (7.576)		6.300 (7.402)
Gender						
Female	3.334 (5.481)	0.2549	3.399 (5.381)	6.444 (8.216)	0.1138	6.772 (7.987)
Male	2.816 (4.574)		2.922 (4.468)	5.394 (6.638)		5.685 (6.513)
Age (mean, SD)						
18–34	2.200 (4.341)	0.103	2.532 (4.400)	8.842 (10.810)	0.000***	8.842 (10.810)
35–49	3.534 (5.510)		3.605 (5.365)	7.559 (8.634)		7.671 (8.570)
50–64	3.683 (5.631)		3.764 (5.530)	6.075 (7.080)		6.402 (6.857)
>64	2.388 (4.287)		2.452 (4.181)	4.568 (6.650)		5.131 (6.577)
Province (Granada)	1.704 (3.542)	0.000***	1.923 (3.473)	7.507 (8.527)	0.000***	7.795 (8.287)
Province (Guipuzkoa)	4.442 (5.960)		4.505 (5.941)	4.431 (6.099)		4.776 (5.999)
Household income						
Low	1.901(3.964)	0.000***	2.094 (3.861)	7.186 (8.062)	0.107	7.403 (7.883)
Medium	3.375 (5.396)		3.361 (5.322)	5.788 (7.388)		6.162 (7.138)
High	5.030 (6.087)		5.174 (6.016)	5.526 (7.561)		5.904 (7.399)
Education						
No studies completed	2.224 (4.138)	0.000***	2.266 (3.997)	4.944 (6.894)	0.008***	5.354 (6.721)
Primary education	2.471 (4.357)		2.548 (4.276)	6.179 (6.661)		6.609 (6.512)
Secondary/tertiary education	4.661 (6.256)		4.810 (6.150)	6.978 (8.727)		7.149 (8.595)
Ungrateful task (Yes)	2.939 (4.528)	0.4180	2.992 (4.443)	5.998 (6.812)	0.965	6.241 (6.678)
Ungrateful task (No)	3.303 (5.680)		3.405 (5.540)	5.969 (8.306)		6.356 (8.064)
Caregiving hours						
Low	3.761 (5.833)	0.5660	3.784 (5.744)	7.445 (7.307)	0.000***	7.691 (6.978)
Medium	2.703 (4.789)		2.806 (4.677)	7.441 (8.952)		7.751 (8.559)
High	3.115 (5.013)		3.216 (4.912)	3.852 (5.492)		4.049 (5.525)

(*continued*)

Table 2.

	WTP ($n = 521$)	Comparison of means p-value	WTP (including predicted values for economic zeros) ($n = 554$)	WTA ($n = 529$)	Comparison of means p-value	WTA (including predicted values for protest zeros) ($n = 571$)
High social support (Yes)	3.280 (5.251)	0.1336	3.356 (5.144)	5.838 (7.715)	0.3907	6.232 (7.516)
High social support (No)	2.418 (4.486)		2.724 (4.342)	6.536 (7.026)		6.668 (6.943)
Severe burden (Yes)	3.721 (5.333)	0.0547*	3.877 (5.160)	7.592 (7.996)	0.0006***	7.851 (7.745)
Severe burden (No)	2.810 (4.992)		2.860 (4.897)	5.202 (7.246)		5.569 (7.116)
HRQoL (gigh) (Yes)	3.444 (5.373)	0.0684*	3.500 (5.301)	5.580 (6.752)	0.1036	5.863 (6.620)
HRQoL (high) (No)	2.595 (4.653)		2.735 (4.505)	6.698 (8.830)		7.055 (8.542)
Coping with caring (negative)	3.416 (4.473)	0.7703	3.765 (4.333)	4.462 (4.765)	0.2847	4.836 (5.076)
Formal services at home (Yes)	3.137 (5.146)	0.4138	3.215 (5.035)	6.007 (7.598)	0.5020	6.324 (7.412)

Notes: High HRQL >0.85 points. Severe burden with Zarit score ≥55 points. Low caregiving hours (<56 h/weekly), medium (57–112 h/weekly) and high (>113 h/weekly); N(%); *$p < 0.1$; **$p < 0.05$ and ***$p < 0.01$
Source: Authors' own elaboration

Table 3.
Statistical analysis for WTA. Two-part model

	WTA – first part (Prob WTA = 0) WTA Marginal effects (SE)[1]	Marginal effects (SE) High WTA[2]	WTA – second part (WTA > 0) Marginal effects (SE) Medium WTA[3]	Marginal effects (SE) Low WTA[4]
(a) Without considering "zero protest" responses				
Female	−0.006 (0.046)	0.017 (0.026)	0.000 (0.003)	−0.017 (0.026)
Age (medium)	0.211 (0.067)***	−0.012 (0.030)	−0.000 (0.002)	0.012 (0.030)
Age (high)	0.146 (0.059)***	−0.032 (0.037)	−0.000 (0.005)	0.032 (0.037)
Granada	−0.158 (0.049)***	0.145 (0.032)***	0.001 (0.026)	−0.145 (0.032)***
Severe burden	−0.159 (0.049)***	0.007 (0.026)	0.000 (0.001)	−0.007 (0.027)
High caregiving hours	0.143 (0.047)***	0.047 (0.026)*	0.000 (0.008)	−0.047 (0.026)*
High HRQoL	−0.006 (0.052)	–	–	–
Medium education	−0.015 (0.064)	0.053 (0.036)	0.000 (0.009)	−0.053 (0.037)
High education	−0.018 (0.065)	0.091 (0.037)**	0.000 (0.016)	−0.091 (0.038)**
High social support	–	0.052 (0.031)*	0.000 (0.009)	−0.052 (0.031)*
	$N = 520$		$N = 291$	
	LR $Chi^2 = 58.85$		LR $Chi^2 = 38.05$	
	$R^2 = 0.0824$		$R^2 = 0.1025$	
	McFadden's Adj R^2: 0.054		McFadden's Adj R^2: 0.043	
	Cragg–Uhler (Nagelkerke) R^2: 0.143		Cragg–Uhler (Nagelkerke) R^2: 0.170	

(*continued*)

Table 3.

	WTA – first part (Prob WTA = 0) WTA Marginal effects (SE)[1]	WTA – second part (WTA > 0) Marginal effects (SE) High WTA[2]	Marginal effects (SE) Medium WTA[3]	Marginal effects (SE) Low WTA[4]
(b) Predicted "zero protest" values were considered				
Female	0.002 (0.044)	0.007 (0.023)	0.000 (0.001)	−0.007 (0.023)
Age (medium)	0.158 (0.065)**	−0.032 (0.032)	−0.000 (0.004)	0.025 (0.032)
Age (high)	0.113(0.057)*	−0.007 (0.027)	−0.000 (0.001)	0.007 (0.027)
Granada	−0.142 (0.046)***	0.123 (0.026)***	0.002 (0.023)	−0.125 (0.028)***
Severe burden	−0.154 (0.046)***	0.034 (0.022)	0.000 (0.006)	−0.034 (0.022)
High caregiving hours	0.171 (0.042)***	0.050 (0.028)*	0.008 (0.009)	−0.051 (0.028)*
High HRQoL	−0.002 (0.049)	–	–	–
Medium education	−0.005 (0.060)	0.010 (0.023)	0.000 (0.001)	−0.010 (0.023)
High education	−0.036 (0.060)	0.050 (0.031)	0.000 (0.009)	−0.051 (0.032)
High social support	–	0.077 (0.032)**	0.001 (0.014)	−0.079 (0.033)*
	$N = 562$		$N = 333$	
	LR Chi$^2 = 57.80$		LR Chi$^2 = 36.69$	
	$R^2 = 0.0760$		$R^2 = 0.0945$	
	McFadden's Adj R^2: 0.050		McFadden's Adj R^2: 0.038	
	Cragg–Uhler (Nagelkerke) R^2: 0.132		Cragg–Uhler (Nagelkerke) R^2: 0.152	

Notes: First part outcome: "1" whether WTA = 0, "0" whether WTA > 0; second part Outcome: only positive values for WTA; [2]WTA > 15; [3]5<WTA<=15. [4]0<WTA≤5. High HRQL >0.85 points. Severe burden with Zarit score ≥55 points; N(%); *$p < 0.1$; **$p < 0.05$ and ***$p < 0.01$

Source: Authors' own

Table 4. Statistical analysis for WTP. Two-part model

	WTP – first part (Prob WTP = 0) WTP Marginal effect (SE)[1]	WTP – second part (WTP > 0) Marginal effect (SE) High WTP[2]	Marginal effect (SE) Medium WTP[3]	Marginal effect (SE) Low WTP[4]
(a) Without considering "zero protest" and "economic zero" responses				
Female	−0.049 (0.049)	0.029 (0.0462)	0.001 (0.003)	−0.030 (0.049)
Age (medium)	0.055 (0.063)	0.104 (0.060)*	0.006 (0.007)	−0.110 (0.064)*
Age (high)	0.119 (0.063)*	−0.106 (0.056)*	−0.006 (0.069)	0.112 (0.059)*
Coping with caring (negative)	−0.223 (0.103)**	0.007 (0.096)	0.000 (0.006)	−0.008 (0.102)
Formal services at home	0.221 (0.064)***	0.056 (0.057)	0.035 (0.004)	−0.060 (0.061)
High caregiving hours	0.082 (0.050)	0.142 (0.046)***	0.008 (0.008)	−0.151 (0.048)***
High social support	0.112 (0.062)*	0.059 (0.058)	0.003 (0.004)	−0.062 (0.062)
Medium household income	−0.127 (0.055)**	0.024 (0.053)	0.001 (0.003)	−0.026 (0.056)
High household income	−0.118 (0.067)*	0.192 (0.061)***	0.011 (0.012)	−0.204 (0.067)***
Granada	0.190 (0.517)***	−0.162 (0.051)***	−0.010 (0.009)	0.172 (0.053)***
High HRQoL	–	0.068 (0.050)	0.004 (0.005)	−0.072 (0.053)
	$N = 468$		$N = 232$	
	LR $Chi^2 = 47.05$		LR $Chi^2 = 63.04$	
	$R^2 = 0.0725$		$R^2 = 0.1239$	
	McFadden's Adj R^2: 0.051		McFadden's Adj R^2: 0.073	
	Cragg–Uhler (Nagelkerke) R^2: 0.146		Cragg–Uhler (Nagelkerke) R^2: 0.268	

(*continued*)

Table 4.

	WTP – first part (Prob WTP = 0) WTP Marginal effect (SE)[1]	Marginal effect (SE) High WTP[2]	WTP – second part (WTP > 0) Marginal effect (SE) Medium WTP[3]	Marginal effect (SE) Low WTP[4]
(b) Predicted "zero protest" and "economics zero" were considered				
Female	−0.034 (0.047)	0.019 (0.041)	0.001 (0.003)	−0.018 (0.044)
Age (medium)	0.037 (0.061)	0.078 (0.054)	0.005 (0.006)	−0.084 (0.058)
Age (high)	0.102 (0.061)*	−0.099 (0.051)*	−0.007 (0.007)	0.106 (0.055)*
Coping with caring (negative)	−0.213 (0.094)**	−0.019 (0.083)	0.001 (0.006)	0.021 (0.089)
Formal services at home	0.110 (0.058)*	0.079 (0.053)	0.004 (0.005)	−0.085 (0.057)
High caregiving hours	0.063 (0.048)	0.124 (0.041)***	0.009 (0.009)	−0.133 (0.044)***
High social support	0.110 (0.058)*	0.057 (0.051)	0.004 (0.005)	−0.061 (0.055)
High household income	−0.084 (0.065)	0.159 (0.058)***	0.011 (0.012)	−0.170 (0.063)***
Medium household income	−0.085 (0.053)	0.009 (0.048)	0.000 (0.003)	−0.010 (0.051)
Granada	0.134 (0.050)***	0.159 (0.058)***	−0.009 (0.009)	0.137 (0.050)***
High HRQoL	–	0.059 (0.045)	0.004 (0.005)	−0.064 (0.048)
	$N = 499$		$N = 263$	
	LR $Chi^2 = 33.86$		LR $Chi^2 = 58.95$	
	$R^2 = 0.0491$		$R^2 = 0.1037$	
	McFadden's Adj R^2: 0.017		McFadden's Adj R^2: 0.058	
	Cragg–Uhler (Nagelkerke) R^2: 0.088		Cragg–Uhler (Nagelkerke) R^2: 0.227	

Notes: First part outcome: "1" whether WTP = 0, "0" whether WTP > 0; second part Outcome: only positive values for WTP; [2]WTP > 10; [3]2<WTP ≤10; [4]0<WTP ≤2. High HRQL >0.85 points. Severe burden with Zarit score ≥55 points; *N* (%); *$p < 0.1$; **$p < 0.05$ and ***$p < 0.001$

Source: Authors' own

6. Discussion

In our study, following the general pattern, WTA values exceeded WTP values. Our estimated WTA/WTP ratio is 1.92. This ratio is slightly higher than the values estimated by Rotteveel *et al.* (2020) for health-care goods and services, but it is lower than that found in results typically reported in meta-analyses performed in different goods and services contexts in which WTA is at least twice as strong as WTP (Horowitz and McConnell, 2002). When we focus our attention on those studies that have analysed the value of IC using both elicitation techniques, our values are higher than the usual ones. Van den Berg *et al.* (2005), using two sets of data (patients with rheumatoid arthritis and their informal caregivers), estimated a ratio of 1.05 (mean) – 1.00 (median). De Meijer *et al.* (2010), using a pooled data set of 1,453 caregivers and 832 care recipients, estimated a ratio of 1.3 (mean). In the Chiwaula *et al.* study (2016), which used a sample of 93 carers of women with HIV who were receiving antiretroviral therapy, the ratio soars to 2.4 (mean). Liu *et al.* (2020) analysed the responses of 371 caregivers living in Shanghai, finding a ratio of 1.53 (mean). The exception is the Caplan *et al.* study (2016), where 98 patient–caregiver pairs who lived in the Parisian area were included in a 4-year follow-up study after being affected by a severe traumatic brain injury. Informal caregivers revealed a mean WTP of €17.1 per hour in exchange for being replaced by a professional caregiver for 1 h of care. In contrast, "they were prepared to receive a statistically significantly lower mean value of €11.9 per hour to assist the patients themselves".

Although, under the Hicksian welfare theory, in a context of absence of uncertainty and with perfect information, the values of the WTP and the WTA should converge and there should not be great differences in the answers given by the same individuals (Hammitt, 2015; Kim *et al.*, 2015), a significant divergence between WTA and WTP is identified through numerous CV studies (Horowitz and McConnell, 2002; Sayman and Öncüler, 2005; Whynes and Sach, 2007; Tunçel and Hammitt, 2014). Various arguments have been used in the literature to explain the observed differences. A first reason can be found in the asymmetry of the income effects when both welfare measurements are used. Thus, in the case of WTP, there is a budgetary restriction that individuals have to take into account when making their assessment, while in the case of WTA, there is no maximum limit to which to adjust. This circumstance may be particularly relevant in the case of low-income people, where the expected effect would be a high WTA/WTP ratio (Rotteveel *et al.*, 2020). Other explanations suggest that, in the case of goods and services for which there are no close substitutes, the high uncertainty of this situation involves an aversion to risk that increases the differences between WTA and WTP (Hanemann, 1991; Shogren *et al.*, 1994). This same reasoning can be applied to the case of goods and services where the people surveyed have no experience using them, or where, because of their specialized nature (for example, health interventions), there is a strong informational asymmetry. In this case, preferences can be very imprecise, so only through learning and feedback can something similar to a "true" preference be discovered (Plott, 1996). However, these two reasons could not be invoked in our study, as the interviewees have been caregivers for a long time and are aware of the professional care for which their services could be substituted. Another element to highlight would be the potential presence of strategic biases in the responses of the people surveyed. In such cases, if interviewed people expect to receive compensation in case of withdrawal of the goods or service, they will have incentives to state a WTA higher than the real value of the goods or service. In contrast, if people expect to assume part of the cost of the goods or service, they will have incentives to underestimate it and report a low WTP (Carson and Groves, 2007).

Previous explanations of the typical WTP–WTA discrepancy can be accommodated to some extent within the standard neoclassical framework. Nevertheless, there are other reasons for the WTP–WTA disparity that take us outside that framework, claiming alternative behavioural models. This is the case, for example, of the so-called "constructive process" view of decision-making (Payne *et al.*, 1992). According to this view, estimates of WTP and WTA would be "constructed" rather than merely elicited (Lichtenstein and Slovic, 2006). In other words, preferences would be contingent on supposedly "irrelevant" factors (for standard economics). Two of these irrelevant factors are reference dependence and loss aversion, both of which are explained by Prospect Theory (Kahneman and Tversky, 1979; Tversky and Kahneman, 1992; Barberis, 2013). This theory assumes, on the one hand, that outcomes are valued by individuals with respect to a reference point or endowment state (reference dependence), and on the other hand, that losses from that reference point loom larger than gains (loss aversion). The application of these two psychological factors to the context of our study predicts that caregivers will value more intensively the loss of welfare derived from providing one additional hour of IC, as perceived from their status quo (their reference point), than the gain from providing 1 h less, and this results in the observed WTA–WTP disparity.

The potential of prospect theory to explain the differences between measurements of WTA and WTP lies in psychological drivers that can only be tested unambiguously in an experimental setting through a design that avoids the distortion caused by other confounding factors. This is a limitation of this study that should be overcome in future investigations. The influence of loss aversion in riskless choices that gives rise to the divergence between WTA and WTP estimates is, nevertheless, extensively reported in the literature (Gächter *et al.*, 2022).

Our study identifies the observable variables that largely determine the probability of providing high WTA and WTP values. We opted for a different empirical approach from that followed by Rotteveel *et al.* (2020), who identified age and income as relevant variables to explain the values of the WTA/WTP ratio. In our study, we analysed WTP and WTA values separately. This approach enabled us to identify individual and contextual variables that help explain both declared values in an independent way. We found that some variables explain both WTP and WTA (place of residence and hours of IC provided). However, in other cases, variables that are statistically significant to explain the values obtained using a particular technique are not statistically significant in an alternative technique (severe burden, education, household income and FC at home). In this context, Liu *et al.* also consider it more appropriate to analyse factors associated with WTP and WTA separately. Their results show that the caregiver's income and the caregiver's relationship to the recipient are variables associated with WTP. Care recipient's age, income, least preferred task by the caregiver and sub-scales of caregiver reaction assessment were found to be associated with WTA. Also, VA den Berg *et al.* (2005) found that wealth had a positive effect on WTP and WTA, whereas patients' health had a negative effect. In the work of De Meijer *et al.* (2010), it is shown that caregivers' WTA for one extra hour of IC was positively related to subjective burden, high educational level, income, having domestic help, paid work as an alternative use of time, taking care of a person with either physical or mental health problems and a preference for organizational tasks. Caregivers' WTP for one extra hour of IC was associated with caregiver's health (non-linear relation), income and provision of care to their own child.

To conclude, another important limitation of our work is the time that has elapsed because the surveys were conducted until the time of writing this manuscript. This is because of the fact that the CUIDARSE study had other main objectives than the one set out

in this paper. Among these objectives was the assessment of IC time using different stated and revealed preference techniques (Oliva-Moreno *et al.*, 2019). The previous work was instrumental in the sense that its results could be useful in economic evaluations of health interventions that include spillover effects, such as IC.

However, our work is more aimed at adding to a still scarce body of information that would help researchers understand what factors influence the observed differences between WTP and WTA. Interesting results emerge from these studies, but it would be rash to try to identify significant variables for all types of caregivers, regardless of where they live and the types of tasks they perform. Contextual variables related to the society where they live and perform their care, including the social support received and the recognition of their performance, can be of great importance. This means that generalizing the results of a study carried out in Spain on the value of IC or its determinants to the cases of the Netherlands, the USA, China or Malawi does not seem to be appropriate. By contrast, expanding the number of studies would enable the ratification or qualification of some of the results revealed in the previous studies. A promising line of research for the future would be to connect the evidence collected about individual and contextual variables that help explain WTP and WTA responses to the loss aversion hypothesis as behavioural motivation for the WTA–WTP divergence.

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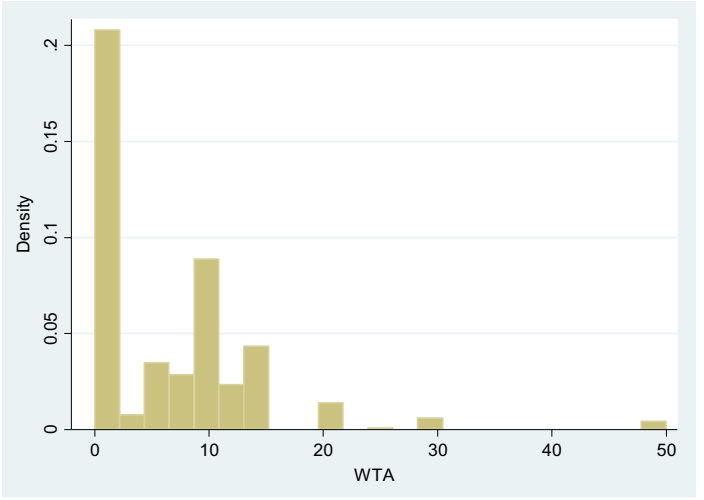
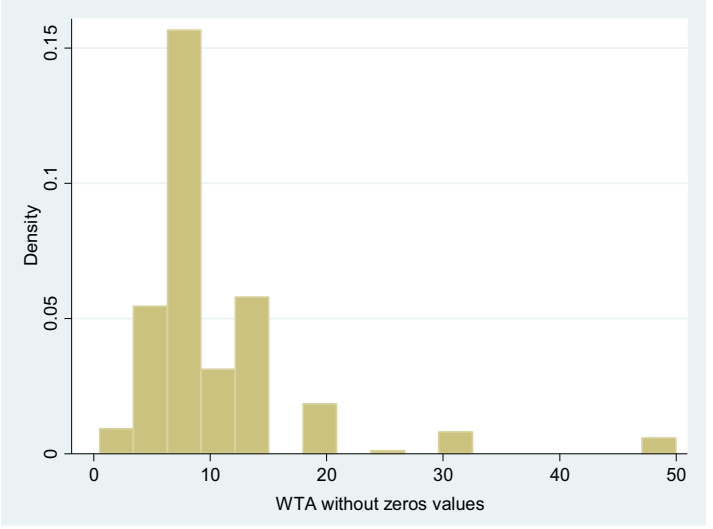
Appendix. Histograms



Source: Authors' own elaboration

Figure A1.
Distribution of WTA with zero values



Source: Authors' own elaboration

Figure A2.
Distribution of WTA without zero values

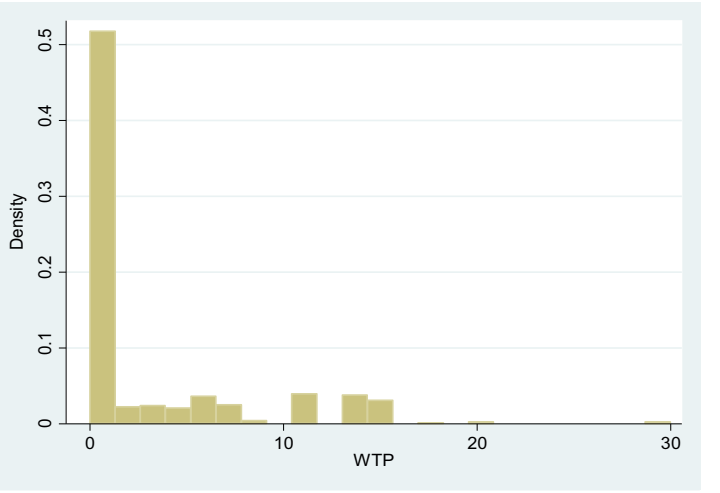


Figure A3.
Distribution of WTP with zero values

Source: Authors' own elaboration

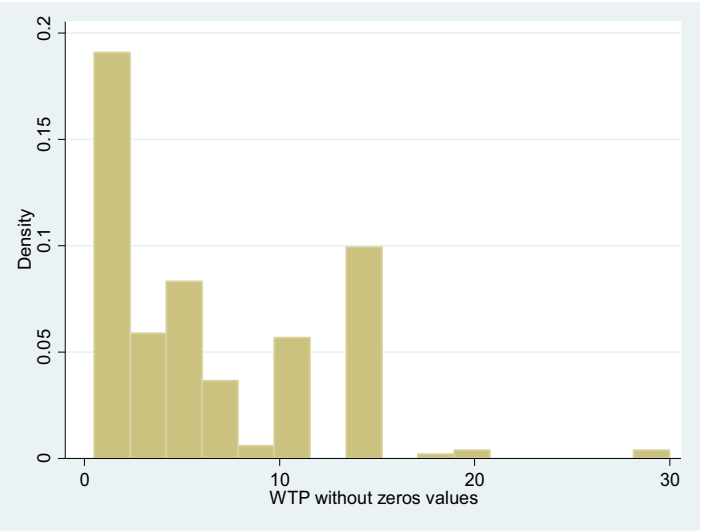


Figure A4.
Distribution of WTP without zero values

Source: Authors' own elaboration

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