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Can a circular payment card format effectively elicit preferences? Evidence from a survey on a mandatory health insurance scheme in Tunisia

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Ethical standards: approval and informed consent: The manuscript does not describe any new clinical studies or patient data collection, and CV data were fully anonymous. No approval by an institutional and/or national research ethics committee was necessary. Informed consent was not required, since the respondents freely agreed to answer the CV survey.

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Abstract

Background The choice of an elicitation format constitutes a crucial but tricky aspect of stated preferences surveys. It affects the quantity and quality of the information collected on respondents' willingness-to-pay (WTP) as well as the potential errors/biases that prevent their true WTP from being observed.

Objectives We propose a new elicitation mechanism, the circular payment card (CPC), showing that it helps overcome the drawbacks of the standard payment card (PC) format. Indeed, it uses a visual pie-chart representation without start or end points: respondents spin the circular card in any direction until they find the section that best matches their true WTP.

Methods We perform a contingent valuation survey regarding a mandatory health insurance scheme in a middle-income country, Tunisia. Respondents are randomly split into three subgroups and their WTP elicited using one of three formats: open-ended (OE), standard PC and the new CPC. We compare the elicited WTP.

Results We find significant differences in unconditional and conditional analyses. Our empirical results consistently indicate that the OE and standard PC formats lead to significantly lower WTP than the CPC format.

Conclusion Overall, our results are encouraging, suggesting that CPC could be an effective alternative format to elicit "true" WTP.

Key Points for Decision Makers

* We propose a new preference elicitation technique (the Circular Payment Card) and compare its theoretical and procedural properties with existing techniques
* We test its feasibility on a survey dealing with a mandatory health insurance scheme
* We find it a useful alternative to existing formats

1. Introduction

Contingent valuation (CV) surveys are used to elicit respondents' preferences for a non-market good or for a good not yet proposed in the marketplace [1]. The strength of these preferences is measured by willingness-to-pay (WTP), i.e. the amount of money respondents declare themselves willing to pay to obtain the good proposed in the scenario. Because these preferences are not observed or revealed through actual behaviors on a market, but only stated, the revelation mechanism must be incentive compatible in order to obtain the respondents' true WTP. This means being "Theoretically Incentive Compatible" (TIC), so as to preclude a strategic misrepresentation of the preferences, and "Procedurally Invariant" (PI), so as not to influence or alter the elicitation of the true WTP.

Indeed, since respondents only rely on the revelation mechanism (the elicitation format in the CV wording) and the hypothetical scenario when making their decision, a non-PI elicitation can affect the quality and quantity of WTP information collected, as well as induce potential errors/biases. In particular, the format can introduce implied value cues that directly lead to respondents anchoring on the proposed bids, taken as an indicator of the quality of the good [2] or as plausible values [3], even if the numbers proposed are unrelated to the good [4]. Implied cues also include a tendency to answer "Yes" ("yea-saying") to avoid answering "No" [5]. Yet although the elicitation format has an impact, none of the various existing formats clearly stands out from the rest: they provide different types of information, collect different data on WTP (continuous, binary or interval) with its statistical and practical properties (in particular, incentive compatibility), widely discussed in the literature [6].

This paper seeks to contribute to the literature on WTP elicitation formats by assessing whether preferences can be elicited effectively by a new technique: the Circular Payment Card (CPC). Unlike the standard Payment Card (PC), the new CPC format uses a visual pie-chart representation without start or end points. Respondents spin the circular card in any direction until they find the section that best matches their true WTP. Here, we test whether this CPC can better elicit true WTP values for a health insurance scheme, thereby providing insights into the current debate on Universal Health Coverage (UHC) [7-8]. Overcoming the obstacles to UHC is important for governments of low- and middle-income countries, if they hope to tackle health equity issues and allow for health risk-sharing [9-11]. Our CV survey asks uninsured Tunisians their WTP for joining an existing mandatory health insurance scheme. We use between-respondent analysis to compare the WTPs elicited using the CPC with those elicited using Open-Ended (OE) and PC formats.

The remainder of the paper is structured as follows. Section 2 presents the most frequently-used elicitation formats, compares their theoretical and procedural incentive properties, and details the new format proposed. Section 3 describes how the survey was administered, and the statistical and econometric methodology. Section 4 reports the results, which section 5 discusses.

2. Comparing elicitation formats in CV surveys

Mitchell and Carson [12] listed nine elicitation formats 25 years ago, but we only discuss the five most used since then (see Table 1), along with their variants (the other elicitation methods are the sealed-bid auction, the oral auction, the checklist (similar to payment card) and the spending question offer).

Format	Pros	Cons	Theoretical Incentive Compatibility (TIC)	Procedural Invariance (PI)
Dichotomous Choice (DC)	Easy to implement Mimics the market Less non-response or extreme values Compatible with any type of survey	Anchoring, yea-saying Larger sample size Choice of bids is crucial	Yes, with the right wording	No
Double-bounded Dichotomous Choice	More accurate values Less non-response or extreme values	Anchoring, starting bias, yea-saying Potential inconsistencies Even larger sample size Choice of bid matters Not compatible with mail surveys	No	No
Bidding game	Eases cognitive process Encourages careful valuation Accurate if followed by open question	Extreme responses Anchoring, starting bias, yea-saying Fatigue effect Not compatible with mail surveys	No	No
Open-Ended (OE)	Accurate Not prone to anchoring or starting point bias Compatible with any type of survey	Extreme responses Difficult to answer, especially for unfamiliar goods More non-response and Don't know	No, except under specific conditions	Yes
Payment card (PC)	Eases evaluation through visual aid Mimics the market Accounts for respondent uncertainty Less non-response or overestimation	Biases from starting values, location and range of bids Not compatible with mail nor phone surveys	No, but approximates continuous values	No
Circular Payment Card (CPC)	Eases evaluation through visual aid Mimics the market Encourages careful valuation Less non-response or overestimation No biases from starting values/location of bids	Biases due to range of bids Number/size of bids limited by considerations of bid value legibility on the circle. Not compatible with phone surveys	No, but approximates continuous values better than PC	No, but better than PC

Table 1 Comparison of elicitation formats

2.1 The most frequently-used elicitation formats

Although the National Oceanic and Atmospheric Administration [13] recommended the *Dichotomous Choice* (DC) format ("If the cost to you was **A**, would you buy (vote for) this item?", [1, p. 871]), it has been criticized in the literature for overestimating the mean true WTP [14-21] as well as for practical reasons. First, it needs an ex ante choice of bids to be proposed (and an inefficient set of bids may affect mean WTP [5]). Second, this elicitation technique carries implied value cues: anchoring or "yea-saying". Thus, it requires larger samples to provide enough information to determine true WTP. Extending the single-bounded version to the *double-bounded version***,** by introducing a second bid conditional on the answer given to the first bid, improves efficiency but does not remove the implied value cues; it may therefore take large samples to reduce the risk of poor information on WTP distribution. Neither the one-and-a-half bound format [22] nor the triple-bounded format [23], have been proven to provide substantial improvements [24]. *Bidding games*, in which respondents face several rounds of discrete choice questions involving increasing/decreasing bids, can induce higher extreme responses in addition to implied value cues.

In the OE direct question, the respondent provides a monetary value that directly corresponds to a change in utility. This can provide more accurate WTP values than other elicitation methods, as it is not prone to implied value cues. Yet it may be difficult to answer, especially when the purchasing decision involves unfamiliar (non-market) commodities. Moreover, it may lead to a higher non-response rate and to more "Don't know"s and extreme responses than other formats [25-27] .

In the standard PC (or payment ladder, proposed by Mitchell and Carson [25]), respondents are required to choose a bid as close as possible to their true WTP from a list with several bids. Respondents answer or tick "Yes", "No" or "Don't know" for each bid. The PC has become popular since it mimics real life decisions (deciding whether or not to buy a good at a given price) better than the OE (deciding the maximum price one would pay for a good). In addition, PC offers visual support that facilitates the construction of evaluation and avoids a high rate of non-response and overestimated values. Although the method reduces the biases associated with closed-ended and bidding formats (especially when starting with very low (or zero) values and ending with very high values), biases due to starting values, the range and the centering of bids may occur. It is worth noting that the interval between the highest accepted bid and the lowest refused bid makes PC a format that directly provides information on respondents' uncertainty. Other formats require specific questions or devices to reveal uncertainty (see variants in section 2.3 for PC, or [28] for OE).

2.2. Incentive compatibility of the elicitation formats

First and foremost, the incentive compatibility issue for direct revelation mechanisms only makes sense for consequential surveys; i.e. "If a survey's results are seen by the agent as potentially influencing agency's actions and the agent cares about the outcome of those actions" ([18], p.183). *In a strict sense*, incentive compatibility means that the properties of the value elicitation format ensure that there is no advantage in answering strategically: the truthful preference revelation is an optimal (and the dominant) strategy for the respondent – referred to as Theoretical Incentive Compatible (TIC). *In a CV sense*, answers should not depend on the psychological or psychometric properties of the elicitation format – referred to as "Procedurally Invariant" (PI).

The DC format is TIC provided that "the vote doesn't influence any other offer that may be made to agents and (.) that the payment mechanism be coercive » ([1, p.877]). However, it is not PI, because the bid is proposed to respondents. Introducing dichotomous follow-up question(s), as in the double-bounded DC and the bidding game, is not considered TIC [29]. It

also makes these two formats not PI, because the subsequent bid(s) act(s) as a signal and influence(s) respondents' behavior.

The OE format has generally been considered as not TIC [30]: according to Gibbard [31] and Satterthwaite [32], no format with more than two alternatives can be TIC without additional restrictions on respondents' preferences [18]. However, Green et al. [33] proved that it is possible to make an OE question TIC if the agent thinks s/he has a positive probability of being decisive and if the payment vehicle used is decoupled (see [34] for field experiments on this topic) and Riera [29] showed that the OE format can be TIC when the final decision relies on a quantile of the respondent's WTP distribution (e.g., the median) rather than the mean. The OE format is PI inasmuch as no potential information is given to respondents through bids, but may lead to more zero WTPs when respondents think their true WTP is lower than the cost anticipated if the good is provided [18].

The PC cannot be proven to be TIC and may, in rare cases, give rise to very high values. However, Carson and Grooves [6] conjecture that using a set of values (instead of one) may do two things: turn it into a choice with a sufficiently large number of options to approximate a continuous matching response; and increase uncertainty over the actual cost of the program, which generally favors conservative values.

The PC format is not PI, being sensitive both to the order in which bids are proposed to respondents, so that significantly higher WTP is elicited for the version starting with high values than for the version starting with low values [35-37], and to the range of bids [38-39]. However, "yea-saying" is less prevalent in the PC format, where respondents still express support for the proposed good even if they choose a low WTP, as opposed to the DC format, where respondents may disregard the level of the bid proposed in order to express their support [20].

2.3. An improved PC format: the CPC

The original PC format has been improved since 1981 with variants tackling two issues: starting-point bias, by introducing randomness, and uncertainty. In the randomized card sorting first used by Carthy et al. [40], respondents sort a set of randomly shuffled cards (with one bid on each card) into three piles: one they would pay for sure, one they would definitely not pay and one they are uncertain about paying. Random card sorting yields very mixed results. For instance, while Covey et al. [39] found that the range bias can be at least as great as with standard PC, Smith [37] showed that random card sorting can produce the most 'valid' PC format values, though he did not test for range bias.

Numerous devices have been used to explore respondents' WTP uncertainty. Dubourg et al. [35] proposed a two-way payment ladder providing two WTPs (the maximum s/he is definitely willing-to-pay and the minimum s/he is definitely not willing-to-pay). Welsh and Poe [16], proposed a multiple-bounded uncertainty choice DC with five possible answers ("Definitely no", "Probably no", "Not sure", "Probably yes" and "Definitely yes") (see [41] for a review). Cook et al. [42] used a traffic light analogy, where green prices mean "sure to buy", yellow prices "uncertain to buy" and red prices "sure not to buy". Further developments by Wang and Whittington [43] used a stochastic card approach that adds to the five possible answers numeric likelihood values (0%, 25%, 50%, 75% and 100%). Recently, Mahieu et al. [44] allowed respondents to choose the shape of their uncertainty function (uniform, asymmetric or symmetric triangular).

Despite these recent improvements, there remain disadvantages to the PC format, chiefly the risk of implied value cues from the range of the bid interval, the starting values and the position of the bids. To overcome these disadvantages, we propose a new form of PC: *the Circular Payment Card* (CPC). Unlike the standard PC, the CPC relies on a visual representation of a

circular card with no predetermined start or end points, no top or bottom, no left or right (see Fig 3 in Appendix 2). The interviewer asks the respondent to think about his/her WTP, and then presents the sheet with the printed CPC in a random position. Respondents are asked to spin it in the direction they want, until they find the section that best corresponds to their WTP values. The text containing the WTP values is curved around the circle to allow easy handling and spinning, with no predetermined direction of rotation. Note that Dubourg et al. [35] tested for (and found) evidence of starting point bias by using a disk with a small window revealing a single bid at a time, presenting half of the sample with a low starting bid and the other half with a high starting bid. However, this differs crucially from our proposed CPC in which respondents are required to spin the whole CPC until they find their maximum WTP values.

In addition to the advantages of the standard PC format, CPC eliminates starting-bid bias (because each section is equally likely to be seen at first glance) and middle-card bias (by construction). Following Carson and Groves [6], it helps strongly reduce the range effect associated with the bids chosen, as the succession of bid ranges mimics a continuous distribution. The circular representation and the spinning reinforce this, and make CPC indisputably more PI than PC. Moreover, spinning the circular card to reach the section corresponding to the *ex ante* WTP chosen requires both cognitive and physical effort, contrary to both the standard PC (increasingly high, easy-to-read bids proposed) and OE (no bid proposed). This effort may encourage greater involvement during the elicitation process. Finally, CPC helps reduce survey costs by being compatible with mail surveys (inserted in the envelope with the survey material) and computer-based surveys (CPC displayed on the screen in a random position and respondents spin it as desired by pressing keyboard keys; or CPC slowly turning before respondents). Limitations include the constraints imposed by CPC legibility (neither the number of bids nor the amounts can be very large) and the arbitrary setting of bid amounts, number and spacing (constant or increasing).

2.4 Empirical comparison of the most frequently-used elicitation formats

The differences summarized in Table 1 explain the lack of consistency in results from different elicitation methods applied to the same dataset [17]. Among the 21 CV studies comparing the DC format with OE and PC formats between 1990 and 2005 and reviewed in Champ and Bishop [14], none showed lower mean WTP with DC than with OE and PC [15-20]. Hammerschmidt et al. [21] is one exception, although on a small sample size (n=73) and for only one of the three diabetic complications assessed in the survey. Whynes et al. [45] compared five elicitation formats to determine the WTP mass population screening for colorectal cancer: DC, bidding game, OE and two PC formats. They obtained far higher values from the two former than from the three latter formats for median WTP, elasticity and consumer surplus. Veisten and Navrud [46] applied an induced truth-telling mechanism to study variations in WTP to protect virgin forest areas around Oslo against cutting, depending on the elicitation format used. In addition to an overestimation of WTP with respect to actual payment, they found evidence that a greater uncertainty effect and "yea saying" effect in DC led to higher WTP than with OE. Comparisons between OE and PC have not proved conclusive: OE led to lower WTP than PC in Donaldson et al. [47] or Whynes et al. [48] for health-related goods, but equality or weak evidence of the reverse relationship was found in Lopez-Martin et al. [49] for environmental goods and Gyrd-Hansen et al. [50] for an ambulance helicopter service.

In order to assess whether preferences can be elicited effectively by this new format, we implement a CV survey to compare WTP elicited using the CPC with WTP elicited using OE and PC formats. We chose these formats for their relative efficiency (see Table 1), and because this enabled us to handle continuous-type WTP elicited with all three formats in one single model.

3. Methods

3.1. Study design

The questionnaire was developed by five researchers specialized in CV and stated preference surveys. After two pre-tests of respectively 20 and 30 respondents, it was fine-tuned for range and centering of bids (PC and CPC) and for wording (in Arabic). The questionnaire consists of four parts. The first introduces the objectives of the CV study and collects general information on the respondents' demographic characteristics, their recent health experiences (health status and utilization of healthcare) as well as the reasons for being excluded from the current health insurance mechanisms. The second part describes the current formal "public single-provider scheme" - run by the "Caisse Nationale d'Assurance Maladie" (CNAM). This scheme covers healthcare services that are only provided by public sector facilities, with a cap on annual co-payments [51]. Respondents are then asked to reveal their willingness-to-join and their quarterly WTP for this Voluntary pre-payment Health Insurance Scheme (VHIS). In the third part, respondents are asked to choose between two other mandatory insurance plans run by the CNAM, and then to declare their maximum WTP for them. These WTP questions, asked subsequently, cannot influence the initial VHIS elicitation process and we do not exploit them here. The last part collects information on the respondents' socio-economic characteristics, and their comments on the proposed schemes. To ensure comprehension of the questionnaire, the benefits of the health insurance scheme were fully explained by the interviewers (see Appendix 1). All subjects were asked for their full consent to participate in the study and no financial incentives were offered.

3.2. Data collection

The CV study was conducted in Tunisia between August 1st and September 30th 2013. The inclusion criterion was being a Tunisian citizen not covered by – nor benefiting from - any health scheme (including the state-subsidized medical assistance programs). As shown elsewhere [51-52], the excluded segment of the population in Tunisia mainly consists of informal sector employees [53] and the unemployed (18.3%, [54]). Therefore, to ensure representativeness, two types of sampling location were identified in the three main regions of Tunisia (North, Central and South): (i) the "Souk", where many informal activities take place and (ii) the "Al-mydan" (i.e. public square), the site of many peaceful demonstrations since 2011 and the so-called "*Jasmine Revolution"*.

We used face-to-face interviews by fully-trained interviewers for two reasons: the surveyed population consists partly of informal employees and rural residents of a developing country (Tunisia), and the survey is complex, comparing different insurance schemes (with questions depending on previous choices and rankings). Of the initial sample of 456 subjects, 30 refused to participate, giving a response rate of 93.42%. The overall sample was then randomly split into three equal sub-groups. Each sub-group was randomly assigned to one elicitation format (OE, PC or CPC) to answer the WTP question for VHIS (see Appendix 2). The same questionnaire was used for all sub-groups, apart from the WTP elicitation format.

3.3. Analysis

3.3.1. Descriptive unconditional analysis

The mean WTP obtained from the three elicitation formats (OE, PC and CPC) was compared using a two-sample mean bi-lateral equality test [55]. In addition, we tested for equality of median WTP across elicitation formats (Fisher's exact test for p-values) and used a chi-squared test of differences in proportions to test for differences in distribution of the first and the last interval of the payment cards [14]. Lastly, since equality tests are sensitive to distributional

assumptions, we performed non-parametric and distribution-free Kolmogorov-Smirnov tests [56].

3.3.2. Conditional analysis

We examined differences in elicitation formats by controlling for the determinants of WTP. Some respondents were directly asked for a point estimate of their WTP (OE format), while others were offered an interval with two specified thresholds c_1 and c_2 (PC and CPC formats). The interval regression model [57-58] was chosen for its ability to handle WTP elicited with all three formats in one single model: exact values in the OE, the interval in the PC formats.

The log-likelihood (lnL) of this model is as follows:

$$\ln L(\beta,\sigma^2;WTP_i,x_i) = \sum_{WTP_i\in n_r} \ln\left[1-\Phi\left(\frac{c_1-x_i'\beta}{\sigma}\right)\right] + \sum_{WTP_i\in n_l} \ln\left[\Phi\left(\frac{c_2-x_i'\beta}{\sigma}\right)\right] + \sum_{WTP_i\in n_d} \ln\left\{\Phi\left(\frac{c_2-x_i'\beta}{\sigma}\right)-\Phi\left(\frac{c_1-x_i'\beta}{\sigma}\right)\right\}$$

$$+ \sum_{WTP_i\in n_n} \left\{-\frac{1}{2}\left[\ln(2\pi)+\ln\sigma^2+\frac{(WTP_i-x_i'\beta)^2}{\sigma^2}\right]\right\}$$

where i indexes respondents, β is the set of parameters to be estimated, σ^2 the variance, WTP the willingness-to-pay, x a set of explanatory variables, n_l the left-censored WTP, n_r the right-censored WTP, n_d the double-censored WTP, n_n non-censored WTP, c_1 the value of the right-censored WTP, c_2 the value of the left-censored WTP.

All statistical analyses are performed using STATA® 12.1 software and use heteroscedastic-robust standard errors.

4. Results

4.1. Descriptive Results

Appendix 3 provides descriptive statistics on WTP in addition to respondents' socio-economic, socio-demographic and health characteristics (health status, healthcare utilization and capacity to pay for a given illness). We find significant differences across elicitation formats for several variables (details upon request): *High School* (p-value=0.0157), *Income* (p-value=0.0202), *Equivalised Income* (p-value=0.0425), *Rural* (p-value=0.06), *Disadvantaged Governorate* (p-value<0.001) and *Outpatient Respondent* (p-value=0.0806).

Although the elicitation formats are perfectly distributed across interviewers (p-value=0.980), the latter are strongly correlated with Rural, Disadvantaged Governorate and Public Squares. This is because only 5 interviewers covered the three regions of Tunisia studied, generating strongly unbalanced distributions of the characteristics of the 8 sample locations by interviewer. Interviewers' dummies and these three spatially related variables will therefore not enter econometric models simultaneously, due to high collinearity. On average, respondents belong to households earning about one and a half times the minimum monthly salary in Tunisia (TND 558.11, at the time of the survey, 1 Tunisian Dinar (TND) = € 0.455 = $ 0.605). Interestingly, 49% of respondents reported a lack of insurance coverage due to their professional activities not being officially declared, in line with previous studies suggesting that almost half of Tunisian youth work in the informal sector [53; 61].

4.2. Comparing formats: Unconditional analyses

Table 2 presents descriptive statistics for the three elicitation methods. Our first question is whether more comprehension or completion difficulties arise with the CPC format than with

the two others. Equality tests show that CPC does not entail either longer response times or greater difficulties answering WTP questions than OE or PC (see upper part of Table 2).

Second, regarding WTP, the mean for the CPC (WTP_{CPC}) appears to be consistently higher than with the other two formats (in this section, we approximate WTP for the two PC formats with the middle of the bid-range elicited [62-63], but the conditional analyses will use the actual lower and upper bounds for these formats). Interestingly, using the CPC also yields the highest median WTP (TND 45), while the PC format yields the lowest median (TND 35), with the OE format in between (TND 40).

Table 2 Summary statistics by elicitation format and equality tests between elicitation formats

Elicitation formats	OE (n=107)	PC (n=104)	CPC (n=125)	All (n=336)
Mean survey completion time [SD] in minutes	20.393 [2.787]	20.5 [3.131]	20.395 [3.086]	20.427 [3.000]
P-values for equality tests	OE not different from PC (0.7924), PC not different from CPC (0.7999) and OE not different from CPC (0.9946)			(0.9564)
Declare difficulty with WTP questions [SD]	0.4112 [0.4944]	0.4519 [0.5001]	0.384 [0.4883]	0.4137 [.4932]
P-values for equality tests	OE not different from PC (0.5506), PC not different from CPC (0.2989) and OE not different from CPC (0.6727)			(0.584)
Mean WTP [SD] in TND	41.15 [26.64]	38.37 [22.10]	47.32 [26.12]	42.58 [25.34]
Median WTP in TND	40	35	45	40
Equality tests on mean WTP	OE not different from PC (0.4092), CPC>PC (0.0054***) and CPC>OE 0(.0774)*			(0.0220**)
Equality tests on median WTP	OE not different from PC (0.493), CPC>PC (0.009***) and CPC>OE (0.035*)			(0.014**)
Proportion equality test of bid in TND 0-10 range	OE not different from PC (0.2287), PC not different from CPC (0.1912) and OE>CPC (0.0120**)			(0.0406**)
Proportion equality test of bid over TND 130 range	OE not different from PC (0.1632), PC not different from CPC (0.3630) and OE not different from CPC (0.4721)			(0.3496)

NB: Outcome of equality tests with corresponding p-values in parentheses. ** if p<0.05, *** if p<0.01. OE=Open-ended, PC=Payment card, CPC=Circular payment card, SD=Standard Deviation, WTP=Willingness-to-pay, TND=Tunisian Dinar.

We test for equality among mean and median WTPs and compute the corresponding p-values. Results reported in the middle part of Table 2 show that both mean and median WTP_{CPC} are significantly higher than those of WTP_{PC} and WTP_{OE}. No significant differences are found between the mean and median of the two latter.

Fig 1 shows the whole distribution of WTP by elicitation method. Mean and median WTP roughly summarize overall WTP distribution, and do not inform on extreme values. The OE format is assumed to provide more extreme responses (i.e. lower and higher WTP) than other formats, and the PC to be subject to starting point anchoring. This is tested through pairwise equality of proportion tests on the proportion of answers corresponding to the first (0-10) and the last (more than 130) bid-ranges. Results in the lower part of Table 2 show that the OE elicitation format leads to a significantly higher proportion of low WTP than the CPC (p-value=0.012), but there are no significant differences for high WTP (p-value=0.3496).

Fig 2 presents the proportion of accepted bids by elicitation method. As shown, the CPC seems to lead to a higher probability of acceptance, which means that the whole distribution of WTP is influenced in an upward direction, not only mean and median WTP. Distribution-free Kolmogorov-Smirnov tests confirm that the OE and the PC elicitation formats do not lead to significantly different WTP distributions (p-value=0.307). However, they reject the null hypothesis of similar WTP distributions of the OE and the CPC formats (p-value=0.006): the OE leads to lower values than the CPC. The hypothesis of similar WTP with the PC and the CPC formats is also rejected (PC leading to lower values than CPC, p-value=0.042).

Overall, the unconditional analyses provide evidence that the CPC format yields higher mean and median WTP and is less prone to extreme values or anchoring on starting values. However, because these differences could be due to heterogeneity in respondents' characteristics across elicitation formats, in particular regarding income and place of residence (*Rural* and *Disadvantaged Governorate*), we now use interval regression models to control for observed heterogeneity.

4.3. Comparing formats: Conditional analyses

4.3.1. Separate estimations by elicitation format

For each elicitation format, we look for the determinants of WTP with parsimonious models obtained by removing variables step by step, starting from the full models and decreasing p-values (see models 1-3 in Table 3).

In each of the formats, we find a very significant and positive effect of income on WTP - which argues for the validity of the stated preference survey [64] - and evidence of an interviewer effect (with a negative effect for interviewers 2 and 4). As already mentioned, the interviewer effect also stands for a joint spatial effect. Models with the three spatially related variables instead of the interviewer dummies show no improvement, although the variables *Disadvantaged Governorate* and *Public Squares* are generally positive and significant. Being employed or self-employed (*Work*) has a significant and positive effect on WTP for OE and CPC.

Some variables are significant only for one elicitation format, generally with the expected sign on WTP: positive for *Age*, *RiskAverse* and *Married* and negative for *Elementary*, *NonDeclared* and *Smoker*.

Table 3 Parsimonious models that explain Willingness to Pay (WTP), by elicitation format

	Model 1 (OE)	Model 2 (PC)	Model 3 (CPC)	Model 4 (All)	Joint equality test based on model 4 when estimated by elicitation format
Variables					
OE format (=1)	-	-	-	-6.140** (.023)	
PC format (=1)	-	-	-	-6.821*** (.006)	
Survey					
Interviewer #2 (=1)	-22.243*** (<.0001)	-29.221***(<.0001)	-10.008*** (.005)	-20.587*** (<.0001)	(.1866)
Interviewer #4 (=1)	-12.941*** (.010)	-11.797** (.020)	-	-6. 208** (.014)	(.7097)
Interviewer #3 (=1)	-	-14.385*** (.001)	9.919** (.045)	-	-
Socio demo					
Equivalised Income	.0228*** (<.0001)	.0201**(.025)	.0255*** (<.0001)	.0243*** (<.0001)	(.8663)
Work (=1)	10.966** (.014)	-	11.463*** (.001)	6.896*** (.016)	(.2663)
Age	-	-	.479*** (.001)	.2758** (.046)	(.0445)
Elementary (=1)	-	-9.677** (.018)	-	-5.720* (.058)	(.5330)
Other					
RiskAverse (=1)	13.773*** (.006)	-	-	9.398*** (.008)	(.3916)
NonDeclared (=1)	-	-	-11.971*** (<.0001)	-5.626** (.014)	(.0149)
Married (=1)	9.050* (.081)	-	-	-	-
Health respondent					
Smoking (=1)	-	-6.513* (.059)	-	-	
Constant	12.471** (.041)	46.957*** (<.0001)	16.616*** (.007)	22.289*** (<.0001)	-
Sigma	22.409*** (<.0001)	17.213*** (<.0001)	17.404*** (<.0001)	20.222*** (<.0001)	-
Observations	107	104	125	336	107+104+125
LR test of joint nullity	36.947*** (<.0001)	48.701*** (<.0001)	92.524*** (<.0001)	144.814*** (<.0001)	27.27** (.0385)
McFadden's R^2	.036	.101	.151	.067	
Cragg-Uhler(Nagelkerke) R^2	.286	.377	.127	.346	

P-values in parentheses * if p<0.10, ** if p<0.05, *** if p<0.01, OE=Open-ended, PC=Payment card, CPC=Circular payment card, LR=likelihood ratio.

4.3.2. Joint estimation over the three elicitation formats

We study the impact of the elicitation format on WTP over the whole sample by introducing dummy variables for the OE and the PC formats (the reference being the CPC format). Model 4 in Table 3 contains results indicating a significant and negative effect of the OE and the PC formats, thus confirming the results of the conditional analyses. Also estimated as a robustness check were various models with different sets of control variables (survey-specific, socio-demographic, specific to the health of the respondent, specific to the health of the members of the respondent's family and others, like respondent's risk aversion and reasons for not yet having a health insurance scheme), as well as with interaction variables that control for elicitation format-dependent effects of socio-demographic characteristics. These additional estimations confirm our results (details upon request).

Regarding the determinants of WTP, the joint estimation confirms previous results: an interviewer effect (with a negative effect for interviewers 2 and 4), a significant and positive effect of income, *Age*, *Work* and *RiskAverse* on WTP, and a significant and negative effect of *Elementary* and *NonDeclared*.

We finally estimate this model independently on each of the three elicitation formats and test for joint equality of estimates of each variable over the different formats (see last column in Table 3). The overall equality test leads to rejection (p-value=0.0385), because of significant differences between PC and CPC estimates (p-value=0.0089) but not between OE and PC (p-value=0.4128) nor OE and CPC (p-value=0.3175).

5. Discussion

In assessing the efficacy of a new type of payment card, the CPC, this paper highlights the impact of the elicitation format on stated WTP in CV surveys. Conditional and unconditional analyses show that the OE and standard PC formats lead to significantly lower values than the CPC. This provides evidence that respondents may rely on different heuristic decisions when giving WTP in the OE and in the two PC formats ([16, 19, 65]. This may stem from the fact that, faced with an OE question that is not typical of purchasing decisions (i.e. setting the price), respondents need to reflect deeply before giving an amount. The CPC is shown to offer certain advantages: it has better incentive compatibility properties and it seems less prone to extreme values or anchoring on starting values than the PC and OE. Moreover, it is not found more difficult by respondents and does not require more completion time than OE and PC. Consequently, the CPC format may ease WTP elicitation, especially for socially disadvantaged and poorly educated populations. Should our results be confirmed by future studies, the CPC may be a useful alternative to already existing formats for eliciting not only monetary values but any continuous outcome, like discount rate, quality of life or time preference.

Our analysis has several limitations. First, we do not study the criterion validity of the CPC (i.e. whether elicited WTP is consistent with actual payments observed in a marketplace), but only its convergent validity (i.e. whether the CPC format provides results consistent with two other elicitation formats), a less definitive test. Criterion validity is rarely studied in the literature, and it was impossible here, as VHIS for the uninsured is not yet being offered. The next step should then be to determine whether WTPs elicited with the CPC for traded goods or services come closer to actual payments than other formats. Second, we focus on differences across elicitation formats and purposely do not consider protest answers nor true zero WTP, because respondents answered the first willingness-to-join question before the elicitation format was used. However, taking self-selection and true zero WTP issues into account should be part of any WTP modeling aimed at predicting WTP in the Tunisian population [6266]. This will be addressed by future research.

Appendix 1: Hypothetical scenario

Introduction by Interviewer:

No one is safe from injury or illness. It is very important to evaluate Willingness-to-pay (WTP), because this will allow a new Voluntary Health Insurance Scheme (VHIS) to be implemented. The VHIS covers only healthcare benefits and is not conditional on exercising a professional activity (employed or self-employed). It covers healthcare expenditures of the party insured and his household members, only with public sector providers. It offers a package of healthcare services exactly the same as those offered by the public scheme currently run by 'CNAM' (Caisse Nationale d'Assurance Maladie).

Similar to the blue color of the public scheme currently run by the 'CNAM', these healthcare services are described in this blue list: Exoneration from out-of-pocket payment in the event of chronic diseases, births, surgical operations, scanner, medical imaging, hemodialysis, lithotripsy, radiological tests, physiotherapy, orthopedic and thermal healthcare services.

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We will now ask you questions on the amount that you are willing-to-pay to join this new voluntary scheme. The value that you are willing-to-pay represents the importance that you attach to the health insurance scheme and to healthcare services in general. Please note that this amount will reduce your expenditure on other items.

Note to the interviewer: (Please give the interviewee the blue list that describes the scheme under consideration and ask her/him to take time to reply to all the questions]

Appendix 2: WTP elicitation questions

Open-Ended elicitation format

Please answer the following question after carefully reading the scheme description.

*The insured will pay their contributions quarterly. Considering your income, what is the **maximum amount** (in Tunisian Dinar, TND) that you are willing-to-pay **quarterly** to join the scheme under consideration?*

Note to the interviewer: (Please fill in the maximum willing-to-pay amount]

/_____/ TND

Payment card elicitation format

Please answer the following question after carefully reading the scheme description.

*The insured will pay their contributions quarterly. Of the amounts illustrated on the payment card and considering your income, what is **the maximum amount** (in TND) that you are willing-to-pay **quarterly** to join the scheme under consideration?*

Note to the interviewer: (Present the payment card] (see below)

0 to 10 TND	
11 to 20 TND	
21 to 30 TND	
31 to 40 TND	
41 to 50 TND	
51 to 60 TND	
61 to 70 TND	
71 to 80 TND	
81 to 90 TND	
91 to 100 TND	
101 to 110 TND	
111 to 120 TND	
121 to 130 TND	
> 130 TND	

If more than TND 130, please fill in the exact amount

/_____/ TND

Please tick (√) the interval you are sure you are willing to pay.

Please put a cross (**X)** against the interval you are sure you are not willing to pay.

Please circle (**O)** the interval of the **maximum amount** you are willing to pay.

Circular payment card elicitation format

Please answer the following question after carefully reading the scheme description.

The insured will pay their contributions quarterly. Of the amounts illustrated on the circular payment card and considering your income, what is the ***maximum amount*** *(in TND) that you are willing-to-pay* ***quarterly*** *to join the scheme under consideration?*

Note to the interviewer: (Present the circular payment card] (see Figure 1 below)

*Please circle (**O**) the section with the* ***maximum amount*** *you are willing to pay.*

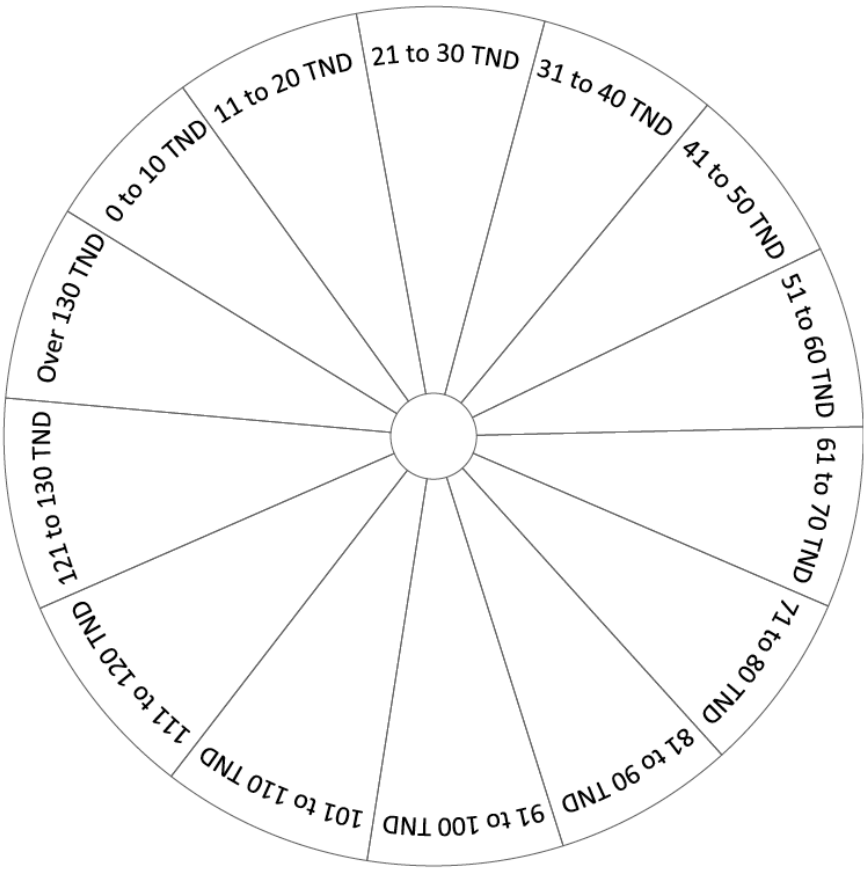


Fig 3 Circular payment card (translated into English)

Appendix 3: Descriptive statistics (n= 426)

Variable definition	Mean (Std. Dev.)
Dependent variables	
WTP = Willingness-to-pay (WTP) for Voluntary Health Insurance System (quarterly, in Tunisian Dinar, TND)	42.583 (25.338)[a]
Respondent characteristics	
Male = **1** if male, **0** if female	0.669 (0 .471)
Age = individual's age (in years)	35.385 (10.395)
Household size = number of household members	2.599 (2.012)
Child = **1** if at least one child under 5 years old in the household, **0** otherwise	0.134 (0.341)
Elderly = **1** if one person over 65 years old in the household, **0** otherwise	0.052 (0.222)
Married = **1** if Married, **0** otherwise	0.417 (0.493)
Illiterate = **1** No schooling, **0** otherwise	0.023 (0.151)
Elementary = **1** primary school, **0** otherwise	0.213 (0.410)
Secondary = **1** secondary education, **0** otherwise	0.516 (0.500)
High School = **1** higher education, **0** otherwise	0.246 (0.431)
Income = Monthly household income (in TND)	558.11 (464.15)
Equivalised Income[b] = □Monthly income / (Household size)$^{0.5}$□ (in TND)	425.80 (425.72)
Work = **1** if employed /self-employed, **0** otherwise	0.789 (0.409)
Rural = **1** living in rural area, **0** otherwise	0.197 (0.398)
Disadvantaged_gov.[c] = **1** living in disadvantaged governorate, **0** otherwise	0.443 (0.497)
Other variables	
NonDeclared = **1** uninsured due to no declared work, **0** otherwise	0.490 (0.500)
Administration = **1** uninsured due to administrative procedures, **0** otherwise	0.340 (0.474)
NoNeed = **1** uninsured due to no need, **0** otherwise	0.663 (0.198)
RiskAverse = **1** if risk-averse, 0 otherwise [d]	0.885 (0.319)
Respondent-specific health variables	
Self-reported health status = **1** if self-reported health status is good, **0** otherwise	0.835 (0.371)
Outpatient respondent = **1** if at least one outpatient care during the last 3 months, **0** otherwise	0.380 (0.486)
Inpatient respondent = **1** if at least one hospitalization during the last 8 months, **0** otherwise	0.093 (0.292)
Chronic condition = **1** if respondent reports a chronic condition, **0** otherwise	0.124 (0.330)
FinancialHealth = **1** if can afford health services, **0** otherwise	0.370 (0.483)
Smoker = **1** if consuming tobacco products, **0** otherwise	0.460 (0.498)
Health variables specific to the family members of the resp.	
Outpatient member = 1 if at least one outpatient care in household during the last 3 months, 0 otherwise	0.5 (0.500)
Inpatient member = 1 if at least one hospitalization in household during the last 8 months, 0 otherwise	0.140 (0.348)
Chronic condition = 1 if one household member reports a chronic condition, 0 otherwise	0.185 (0.389)

Survey specific variables	
PublicSquare = **1** if sample point is a public square, **0** if informal market	0.420 (0.494)
Interviewer#1-5 = Dummy variables for each of the 5 interviewers	-
Time taken to answer the survey (in minutes)	20.427 (3.000)
Proportion that declares difficulties in answering WTP (in %)	0.4137 (.4932)

[a] Ninety respondents refuse to give a WTP.

[b] Equivalised income is computed based on the Organization for Economic Co-operation and Development equivalence scale, by dividing household income by the square root of household size [59].

[c] According to decree n° 2008-387 of February 11, 2008.

[d] Based on six modalities generated according to the method of Barsky et al. [60].

References

1. Carson RT, Hanemann WM. Chapter 17 Contingent valuation. In: Mäler KG, Vincent JR, Handbook of environmental economics Vol 2.Amsterdam: Elsevier ; 2005. pp. 821-936.
2. Boyle K, Johnson FR, McCollum D. Anchor and adjustment in single-bounded dichotomous-choice questions. Am J Agric Econ. 1997;79(5):1495-500.
3. Herriges J, Shogren J. Starting point bias in dichotomous choice valuation with follow-up questioning. J Environ Econ Manag. 1996;30:112-31.
4. Wilson TD, Houston CE, Etling KM, Brekke N. A new look at anchoring effects: basic anchoring and its antecedents. J Exp Psychol: General. 1996;125(4):387-402.
5. Kanninen B. Bias in discrete response contingent valuation. J Environ Econ Manag. 1995:28:114-25.
6. Carson RT, Groves T. Incentive and information properties of preference questions commentary and extensions. In: Bennett J, editor, International handbook on non-market valuation. Northampton: Edward Elgar; 2011.
7. O'Connell T, Rasanathan K, Chopra M. What does universal health coverage mean? Lancet 2014;383(9913):277–9.
8. Vega J. Universal health coverage: the post-2015 development agenda. Lancet 2013;381:179-80.
9. Asgary A, Willis K, Taghvaei AA, Rafeian M. Estimating rural households' willingness to pay for health insurance. Eur J Health Econ. 2004;5(3):209-15.
10. World Health Organization (WHO): The World Health Report 2013: Research for Universal Health Coverage. Geneva: World Health Organization; 2013
11 Damrongplasit K, Melnick G. Funding, coverage, and access under Thailand's universal health insurance program: An update after ten years. Appl Health Econ Health Policy. 2015;13(2):157-66.
12. Mitchell RC, Carson RT. Using surveys to value public goods: the contingent valuation method. Baltimore: Johns Hopkins University Press; 1989.
13. Arrow K, Solow R, Portney PR, Leamer EE, Radner R, Schuman H. Report of the NOAA panel on contingent valuation. Federal Register. 1993;58(10):4601-14.
14. Champ PA, Bishop RC. Is willingness to pay for a public good sensitive to the elicitation format? Land Econ. 2006;82(2):162-73.
15. Lunander A. Inducing incentives to understate and to overstate willingness to pay within the open-ended and the dichotomous-choice elicitation formats: an experimental study. J Environ Econ Manag. 1998;35:88-102.
16. Welsh MP, Poe GL. Elicitation effects in contingent valuation: comparisons to a multiple bounded discrete choice approach. J Environ Econ Manag. 1998;36:170-85.
17. Cameron TA, Poe GL, Ethier RG, Schulze WD. Alternative non-market value-elicitation methods: are the underlying preferences the same? J Environ Econ Manag. 2002;44:391-425.
18. Carson RT, Groves T. Incentive and information properties of preference questions. Environ Resour Econ. 2007;37:181-210.
19. Frör O. Bounded rationality in contingent valuation: empirical evidence using cognitive psychology. Ecol Econ. 2008;68:570-81.
20. Uehleke R. Willingness to pay for national climate change mitigation policies: elicitation format and scope effects. Istanbul: 5th WCERE; 2014.
21. Hammerschmidt T, Zeitler HP, Leidl R. Unexpected yes- and no-answering behaviour in

the discrete choice approach to elicit willingness to pay: A methodological comparison with payment cards. Int J Health Care Finance Econ. 2003;3:147–66.

22. Cooper JC, Hanemann WM, Signorello G. One-and-one-half-bound dichotomous choice contingent valuation. Rev Econ Stat. 2002;84:742–50.
23. Bateman IJ, Langford IH, Jones AP, Kerr GN. Bound and path effects in double and triple bounded dichotomous choice contingent valuation. Resour Energy Econ. 2001;23:191-214.
24. Bateman IJ, Day BH, Dupont D, Georgiou S: Procedural invariance testing of the one-and-one-half-bound dichotomous choice elicitation method. Rev Econ Stat. 2009;91(4): 806-820.
25. Mitchell RC, Carson RT. An experiment in determining willingness to pay for national water quality improvements. US Environmental Protection Agency report (grant #R 806906010). Washington: Resources for the Future; 1981.
26. Hoehn JP, Randall A. Too many proposals pass the benefit cost test. Am. Econ. Rev. 1989;79;544-551.
27. Hoevenagel R. An assessment of contingent valuation surveys. In: Navrud S, editor, Pricing the European environment. Oxford and New York: Oxford University Press; 1992. pp. 177-194.
28. Håkansson C. A new valuation question: Analysis of and insights from interval open-ended data in contingent valuation. Environ Resour Econ. 2008;39(2):175-188.
29. Riera P. Incentive compatibility in environmental valuation: some positive results. Bilbao: EAERE; 2003.
30. Hoehn J, Randall A. Satisfactory benefit cost indicator from contingent valuation. J Environ Econ Manag. 1987;14:226-47.
31. Gibbard A. Manipulation of voting schemes: a general result. Econometrica 1973;41:587-601.
32. Satterthwaite M. Strategy-proofness and arrow conditions: existence and correspondence theorems for voting procedures and welfare functions. J Econ Theory. 1975;10:187–217..
33. Green D, Jacowitz K, Kahneman D, McFadden D. Referendum contingent valuation, anchoring, and willingness to pay for public goods. Resour Energy Econ. 1998;20:85-116.
34. Schläpfer F, Bräuer I. Theoretical incentive properties of contingent valuation questions: do they matter in the field? Ecol Econ. 2007;62:451-60.
35. Dubourg WB, Jones-Lee M, Loomes G. Imprecise preferences and the WTP-WTA disparity. J Risk Uncertain. 1994;9:115-133.
36. Dubourg WB, Jones-Lee M, Loomes G. Imprecise preferences and survey design in contingent valuation. Economica. 1997;64:681-702.
37. Smith RD. It's not just what you do, it's the way that you do it: the effect of different payment card formats and survey administration on willingness to pay for health gain. Health Econ. 2006;15(3):281-93.
38. Whynes DK, Wolstenholme JL, Frew E. Evidence of range bias in contingent valuation payment scales. Health Econ. 2004;13:183-90.
39. Covey J, Loomes G, Bateman I. Valuing risk reductions: testing for range biases in payment card and random card sorting methods. J Environ Planing Manag. 2007;50(4): 467-82.
40. Carthy T, Chilton S, Covey J, Hopkins L, Jones-Lee M, Loomes G, et al. On the contingent valuation of safety and the safety of contingent valuation: Part 2 - the CV/SG "chained" approach. J Risk Uncertain. 1999;17:187-213.

41. Mahieu P-A, Riera P, Kriström B, Brännlund R, Giergiczny M. Exploring the determinants of uncertainty in contingent valuation surveys. J Environ Econ Policy. 2014;3(2):186-200.
42. Cook J, Jeuland M, Maskery B, Whittington D. Giving stated preference respondents "time to think": results from four countries. Environ Resour Econ. 2012;51(4):473-96.
43. Wang H, Whittington D. Measuring individuals' valuation distributions using a stochastic payment card approach. Ecol Econ. 2005;55:143-54.
44. Mahieu PA, Wolff FC, Shogren J. Interval bidding in a distribution elicitation format. FAERE Working Paper, 2014.16, 2014.
45. Whynes DK, Frew E, Wolstenholme JL. Willingness-to-pay and demand curves: a comparison of results obtained using different elicitation formats. Int J Health Care Finance Econ. 2005;5:369–86.
46. Veisten K, Navrud S. Contingent valuation and actual payment for voluntarily provided passive-use values: assessing the effect of an induced truth-telling mechanism and elicitation formats. Appl Econ. 2006;38:735-56.
47. Donaldson C, Thomas R, Torgerson DJ. Validity of open-ended and payment scale approaches to eliciting willingness to pay. Appl Econ. 1997;29(1):79-84.
48. Whynes DK, Frew E, Wolstenholme JL. A comparison of two methods for eliciting contingent valuations of colorectal cancer screening. J Health Econ. 2003;22:555–74.
49. Lopez-Martin B, Montes C, Benayas J. Economic valuation of biodiversity conservation: the meaning of numbers. Conserv Biology. 2008;22:624–35.
50. Gyrd-Hansen D, Jensen ML, Kjaer T. Framing the willingness-to-pay question: impact on response patterns and mean willingness to pay. Health Econ. 2014;23:550–63.
51. Makhloufi K, Ventelou B, Abu-Zaineh M. Have health insurance reforms in Tunisia attained their intended objectives? Int J Health Care Finance Econ, 2015;15(1):29-51.
52. Abu-Zaineh M, Romdhane HB, Ventelou B, Moatti JP, Chokri A. Appraising financial protection in health: the case of Tunisia. Int J Health Care Finance Econ. 2013;13(1):73–93.
53. Gatti R, Angel-Urdinola D, Silva J, Bodor A. Striving for better jobs: the challenge of informality in the Middle East and North Africa region: Overview. Washington: World Bank; 2011.
54. NIS, National Institute of Statistics Tunisia: First Results of Employment - National Survey second quarter, Tunis: NIS; 2011.
55. Ryan M, Scott DA, Donaldson C. Valuing health care using willingness to pay: a comparison of the payment card and dichotomous choice methods. J Health Econ. 2004;23(2):237-58.
56. Chakravarti IM, Laha RG, Roy J, editors. Handbook of methods of applied statistics. Vol. 1: Techniques of computation, descriptive methods and statistical inference., London: John Wiley and Sons; 1967.
57. Wooldridge JM. Econometric analysis of cross section and panel data. 2nd ed. Cambridge: MIT Press; 2002.
58. Anderson LR, Mellor JM. Are risk preferences stable? Comparing an experimental measure with a validated survey-based measure. J Risk Uncertain, 2009;39:137-60.
59. Atkinson AB, Rainwater L, Smeeding TM. Income distribution in OECD countries, evidence from the Luxembourg income study. Volume 18 of OECD Social Policy Studies. Paris: Organization for Economic Co-operation and Development; 1995.

60. Barsky RB, Juster FT, Kimball MS, Shapiro MD: Preference parameters and behavioral heterogeneity: an experimental approach in the health and retirement study. Quarterly J Econ. 1997;112(2):537-79 .
61. Loayza N, Wada T. Informal labor in the Middle East and North Africa: basic measures and determinants. Washington: World Bank, 2009.
62. Cameron TA, Huppert DD. OLS versus ML estimation of non-market resource values with payment card interval data. J Environ Econ Manag. 1989;17:230-46.
63. Yang S-H, Hu W, Mupandawana M, Liu Y. Consumer willingness to pay for fair trade coffee: a Chinese case study. J Agri Appl Econ. 2012;44(1):21–34.
64. Bishop R, Woodward R. Valuation of environmental amenities under certainty. In: Bromley D, editor, Handbook of environmental economics. Oxford: Blackwell Publishers; 1995. pp. 543–667.
65. Hanemann WM. Theory versus data in the contingent valuation debate. In: Bjornstad J, Kahn JR, editors. The contingent valuation of environmental resources: methodological issues and research needs. Brookfield: Elgar; 1996.
66. Fonta WM, Ichoku HE, Kabubo-Mariara J. The effect of protest zeros on estimates of willingness to pay in healthcare contingent valuation analysis. Appl Health Econ Health Policy. 2010;8(4):225-37.

Fig. 1 Willingness-to-pay distribution by elicitation format (TND=Tunisian Dinar)

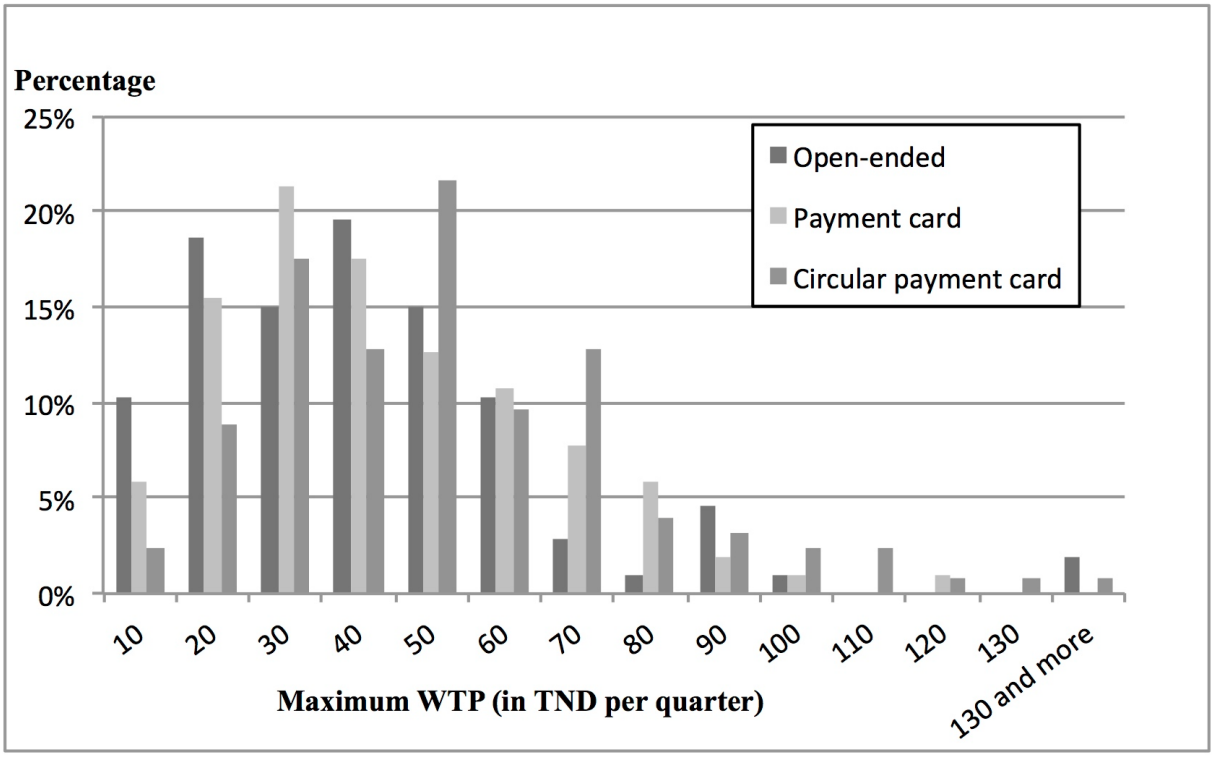


Fig. 2 Proportion of accepted bids by elicitation format (TND=Tunisian Dinar)

