WORK IN PROGRESS: NOT TO BE QUOTED WITHOUT PERMISSION OF THE AUTHORS

Marginal versus standard WTP: an application to out-of-hours and emergency care

Karine Lamiraud[1] and Cam Donaldson[2]

Paper presented to third CES/HESG Meeting, Aix en Provence, 11-13th January 2012

1. ESSEC Business School, Paris & University of Lausanne, Switzerland
2. Yunus Centre for Social Business & Health, Glasgow Caledonian University

Abstract

Previous applications of WTP have shown that respondents find it difficult to discriminate between various therapeutic options, revealing high proportions of preference reversals between orderings based on WTP values and simple rankings of the programmes. Hence a marginal WTP approach was devised in order to encourage more differentiated answers and a higher degree of consistency among the respondents. However there is little evidence showing that the marginal approach might indeed achieve greater consistency between explicit rankings and implicit rankings inferred from WTP values.

We compared a standard and a marginal approach with explicit ranking in the context of a study assessing preferences for different types of out-of-hours and emergency care in France. Preferences for six major service types (or 'actors') were elicited. 280 people representative of the French adult population were interviewed, of whom 140 received the marginal version and 140 received the standard version. The results suggest that the marginal approach provides a ranking of options more in line with explicit ranking, with only two options not being significantly different in the explicit ranking exercise and in the marginal approach. Overall, the standard approach is reasonably consistent with explicit ranking but does not perform as well as the marginal approach and proves unable to differentiate between the five most preferred actors. We used the results in a cost-benefit analysis, thus providing one of the first economic evaluations in the area of out-of-hours and emergency care.

Our findings suggest that the marginal approach provides results that can be used in priority setting contexts.

1. Introduction

The willingness to pay (WTP) method remains controversial in the health arena, in part precisely because it involves monetary valuation of benefits. How can we possibly place a value on life or compare heart transplants with hip replacements? However, given that decisions have to be made which will imply values of such goods, it could be argued that the real question lies in whether the validity of explicit WTP valuation methods can be improved. Attempts to do this have been made recently through the introduction of the 'marginal' approach to WTP elicitation (Shackley and Donaldson, 2002). However, the marginal approach remains relatively untested compared with more 'conventional' ways of eliciting WTP, the main purpose of this paper being to present such a test.

The context for the application of WTP is in aiding decision making about different forms of emergency and out-of-hours service provision in France. As explained in the following section, the fact that several alternative forms of provision are offered, made this application particularly relevant to use of the marginal WTP approach. Given the practical nature of the application, the study also allowed us to undertake a cost-benefit analysis (CBA) of different forms of provision, which is important due to recent criticism that many WTP applications in health are methodological and do not follow through to full CBAs.

Following the background as to why a marginal approach is relevant to the policy issue addressed, and to the policy issue itself, we outline the methods and results from the study before discussing implications for future research and policy.

2. Background

Testing the marginal approach

Values for 'intangibles', such as health care, are difficult to validate when, by definition, they cannot be confirmed through observing 'real world' behaviour in the market place. An alternative to such validation is to construct simple tasks, whereby survey respondents explicitly rank competing health programmes, against which their WTP for each (and the ordering this implies) can be compared. One further practical reason for conducting such studies, in which each respondent in a survey is asked to value several competing alternatives, is the reality of publicly-funded health care.

Multiple programmes need to be assessed by any one respondent because such programmes compete for funds (Boardman et al., 1996; Luchini et al., 2003). The reason for asking respondents not only to rank such programmes in order of preference but also to state a WTP for each, is to allow the analyst to elicit extra information about strength as well as direction of preference.

The method is also useful for detecting whether ability to pay is problematic when using WTP to compare disparate programmes (Boardman et al., 1996; Donaldson, 1999); as ranking of programmes by different income groups can be compared with their WTP values to determine whether WTP orderings are driven by ability to pay. Even for health technology assessment bodies interested in the value of a QALY, the method of using WTP to compare values attached to disparate alternatives can prove useful. Such bodies are beset with issues around whether QALY gains for some groups are worth more than for others; life-extending drugs for terminal cancer patients being a case in point (Lakhani, 2008). One way of establishing the views of the public as to whether any "premiums" should be attached to health gains from any particular programmes is to set up such programmes as competing against each other in hypothetical WTP scenarios.

For such uses of WTP to aid decision making, a basic prerequisite would be an acceptable degree of convergence between respondents' stated rankings and rankings inferred from their stated WTP values. As an example of a perfectly valid method, an individual giving an ordering of three programmes as 1,2,3 might give WTP values for these three programmes of $100, $75 and $50 respectively. Early results, from a large project called 'EuroWill', funded by the European Commission, and its predecessor, demonstrated a lack of convergence between orderings based on explicit programme rankings and those derived from respondents' WTP values (Olsen and Donaldson, 1998; Olsen, 1997; Olsen et al., 2005). These results would appear to confirm those of studies in other areas of applied economics, whereby stated WTP values do not reflect more-natural orderings (Schkade and Payne, 1994). More generally the inability of patients'WTP values to discriminate between treatment options has been highlighted in the context of the comparison of multiple programmes. However, WTP practitioners have defended the method, largely on the grounds that such problems have been due to compromised study designs (Carson et

al., 2000; Smith, 2003). Nevertheless, such adverse empirical results present serious challenges to CBA aimed at aiding social decision making with respect to allocating publicly-funded health care resources.

The marginal approach was developed to overcome the above challenges from the EuroWill Project. A marginal WTP approach was devised in order to encourage more differentiated answers and a higher degree of consistency among the respondents (Shackley and Donaldson, 2002). With the marginal approach, our hypothetical individual from above might give a value of $50 for his/her lowest-ranked programme, and would then be asked how much more s/he would be willing to pay for his/her second-ranked programme. Matching the values given above, we would expect the response to be $25 (as $25+$50=$75). When asked to value his/her highest-ranked option over and above the second, another response of $25 would be expected. Although the marginal approach initially applied in EuroWill did not actually enhance convergent validity to any great degree (Schackley and Donaldson, 2002), the number of partially consistent responses reported in previous papers indicated potential for further development of the method (Olsen et al., 2005)

Emergency and out-of-hours medical services in France

There are six service types (or 'actors') in the field of emergency and out-of-hours medical assistance in France. Mobile and fixed means can be distinguished.

Mobile means come to the place where the patient is: these include SAMU/SMUR, SOS Doctors, physicians on duty, imbulance/firemen. These actors will move or not only after the extent of urgency is assessed on the phone. The SMUR/SAMU are sent from hospital. They are involved primarily in vital emergencies and medical doctors are on board. Doctors on duty perform out-of-hours and emergence care in addition to their usual duties. Doctors on duty are generally less equipped than SOS doctors who are dedicated to out-of-hours and emergency care and have an electrocardiogram and perfusion devices. Firemen/imbulance are not equipped with any medical doctors.

In the case of fixed means, patients must travel to emergency care units. Outpatient emergency centers (Maison Médicale de Garde) provide unscheduled medical consultations for outpatient care. Care is provided by a GP. Emergency units at hospital also provide out-of-hours medical service.

These six types of care are currently financed by social health insurance.

3. Data

Survey

A telephone survey was carried out to assess preferences for the different emergency services. It was carried out by TNS Sofres, one of the biggest polling institutes in France, from July 17th to July 27th 2009. A representative sample of the French population living in urban areas > 100 000 inhabitants was selected[1]. Two questionnaires were used, a standard questionnaire and a marginal one. Respondents were randomly assigned to receiving the standard or the marginal questionnaire, thus defining two study samples.

Questionnaires

All questionnaires were divided into four sections.

Some introductory information was first provided to the respondent in both questionnaires. The interviewer described the characteristics of each emergency and out-of-hours medical actor (as described above) so that respondents should have common knowledge of each. The interviewer also said to the respondents that they would have to assume that the costs of the six options were equal in what was following. Secondly, all respondents were asked to rank the six different types of actors in order of preference, from the most preferred (ranked 1) to the least preferred option (ranked 6). No equal ranking was possible. In the third section of the questionnaire, all respondents were asked to "imagine that financing mechanisms for SAMU, SOS Doctors, physicians on duty, firemen/imbulance, emergency units at hospital and emergency outpatient centers had been changed and that the necessary resources should be provided by private households through insurance premia". Only those subscribing to the corresponding insurance contracts would be able to benefit from emergency care or out-of-hours services in case of need. Respondents were asked their maximum WTP in terms of such insurance premia. In the fourth section of the questionnaires, socio-demographic information was collected as well as information concerning health status and supplementary coverage. Respondents were

[1] This choice was driven by the fact that the number of emergency and out-of-actors actors is much lower in rural areas

also asked whether they called one of the six emergency actors during the previous year.

It was with regard to WTP questions in the third part of questionnaires that both questionnaires differed. In the standard questionnaire, respondents were asked the maximum premium that they would be willing to pay for each emergency and out-of-hours actor. The order of the six questions was randomized so as to avoid sequence effects (Payne et al., 2000). Respondents had to imagine that they were given back the amount they said they were willing to pay for the previous programme. In the marginal questionnaire, following the ranking exercise in the second section of the questionnaire, the lowest ranked actor was selected for the first WTP valuation. Respondents were asked the maximum premium that they would be willing to pay for the actor ranked sixth. Respondents were then asked how much more they would be willing to pay for the second least preferred option and so on.

The method for WTP values elicitation was the following. The interviewer first cited an amount randomly selected out of 20 possible amounts ranging from "5" to "more than 180 euros" per month (see Appendix 1). The respondents had to say if this amount was an amount that they were sure they would pay. If the respondents answered yes, then the interviewer cited the next highest amount until the respondents said no or until the category «more than 180 euros» was reached. If the respondents answered no, then the interviewer cited the next lowest amount until the respondents said yes or until « 5 euros » was reached. Going up the scale, the last value to which the respondents said "yes" was taken to be their maximum WTP. Going down the scale, the first value to which the respondent answered "yes" was taken to be their maximum WTP. This approach in discussed in the discussion section.

An ex ante WTP approach (i.e. where the need for care as well as outcomes are not known for certain) was chosen over an ex post WTP approach (where respondents' conditions are known for certain but not necessarily the outcome of intervention) because of the context of emergency. In case of extreme emergencies WTP may converge to infinity if respondents are made to imagine that they suffer from acute pain. The valuation approaches which have been developed in the context of ex ante approaches use either insurance premiums or taxation contribution (Olsen et al, 2004). We opted for an insurance based approach because most French people are used to

paying premiums for supplementary health insurance coverage. Furthermore, the idea of a tax increase might have induced many protest answers in the context of France.

Statistical and econometric methods

The empirical analysis followed two main objectives. Firstly, it aimed at testing the marginal approach, i.e. (*i*) whether it improved consistency between respondents' explicit ranking of the programmes and the ranking implied by their WTP values; and (*ii*) whether it made it possible to differenciate between the various programmes. Secondly, the empirical analysis aimed at comparing the six emergency actors in a cost-benefit analysis. Only preliminary results for each are presented here.

Testing the marginal approach

The distribution of ranking was computed for each type of emergency service in marginal and standard questionnaires. Chi-squared statistics were performed to test for differences in the distribution of respondents' answers to the ranking question between the standard and marginal questionnaires.

In marginal questionnaires, WTP for each actor was computed on the basis of marginal answers. For example, if SOS doctors was the 5th preferred actor, then WTP for SOS doctors = WTP for the sixth preferred actor plus additional WTP for SOS; if SOS was the 4th preferred actor, then WTP for SOS = WTP for the sixth preferred actor plus additional WTP for the 5th preferred actor + additional WTP for SOS). Mean and median WTP values were computed for each emergency actor in the standard and marginal questionnaires. Within each study sample, tests of comparison in WTP for each possible pair of actors were performed using paired t-test and pearson chi-squared test of the equality of the medians. For each actor, test of differences in WTP were also carried out between the standard and marginal questionnaires.

The consistency between respondents' explicit ranking of the programmes and the ranking implied by their WTP values was examined in two main ways.

Firstly, we defined three levels of consistency: full consistency, partial consistency and inconsistency. For a given actor, fully consistent answers were those for which

the explicit ranking was identical to the implied WTP ranking (e.g. SOS doctors is the second most preferred option; values in monetary units are (60 50 30 20 40 10) for respectively SAMU, SOS doctors, doctors on duty, imbulance/firemen, hospital emergency units, outpatient emergency centers, which means that SOS doctors is also ranked second based on the ranking derived from WTP values). Partially consistent answers are those for which the explicit ranking did not exactly match the implied WTP ranking, but which could not be defined as inconsistent (e.g. the explicit ranking ranked SAMU/SMUR as the fourth most preferred option. Values in monetary units are (10 10 0 10 10 10) for respectively SAMU/SMUR, SOS doctors, doctors on duty, imbulance/firemen, hospital emergency units, outpatient emergency centers. Here the WTP values suggest that SAMU/SMUR belongs to one of the five equally most preferred options. This is not inconsistent with the explicit ranking which ranked SAMU/SMUR as the fourth most preferred option. For some reason, the WTP questions have not provided differentiated answers between the most preferred options. Inconsistent answers refer to all other cases. For each actor we computed the number of cases when answers were fully consistent, partially consistent, and inconsistent. In marginal questionnaires, there are no inconsistent answers by construction.

Secondly, we carried out econometric analyses. We estimated an ordered probit model based on the explicit ranking of actors (1) and a tobit model based on WTP values (2), controlling for respondents'characteristics. The models are the following:

$$RANK_{ij} = Z_j\alpha + X_{ij}\beta + \varepsilon_{ij} \quad (1)$$

$$WTP_{ij}^{*} = Z_j a + X_{ij} b + e_{ij} \quad (2)$$

$RANK_{ij}$ is the explicit rank provided by individual *i* for option *j* ($RANK_{ij} \in \{1, \dots, 6\}$, 1 = most preferred actor .... 6 = least preferred actor).

WTP_{ij}^{*} is the maximal WTP of individual *i* for option *j*. Some WTP values may be left (below 5 euros) or right-censored (above 180 euros).

X_{ij} is a vector of individual characteristics.

Z_j represents a set of option dummies. SOS doctors will be used as the reference group.

We used the cluster option in all regressions because each respondent assessed all six emergency options. All regressions were run excluding the individuals with very small (< 5 euros) answers for all six options.

The ordered probit model was estimated on the whole study sample. Two tobit estimations were run, in the marginal and standard questionnaire subsamples, thus providing us with a ranking of actors based on the marginal and standard questionnaires respectively. The extent of consistency between these rankings and the ranking based on equation (1) makes it possible for us to assess whether the marginal questionnaire improves consistency with the explicit ranking or not.

Using the results in a Cost Benefit Analysis

The results above make it possible for us to compute the difference in benefits between any pair of actors. Let us assume that we aim at comparing SOS doctors (j_1) versus SAMU/SMUR (j_2) in the French setting. The incremental cost benefit ratio can be computed as follows:

$$\frac{\left(WTP_{j_2} - WTP_{j_1}\right) * 12 * number\ of\ households\ in\ France}{\left(C_{j_2} - C_{j_1}\right) * number\ of\ emergency\ users\ during\ a\ given\ year}$$

$(WTP_{j_2} - WTP_{j_1})$ is the mean difference in benefits between SAMU/SMUR and SOS doctors per household per month. The value is provided by the coefficient *a* on SAMU/SMUR dummie variable when SOS doctors is used as the reference group. $(C_{j_2} - C_{j_1})$ is the difference in average cost per patient per annum between SAMU/SMUR and SOS doctors.

4. Results

Descriptive statistics

280 people representative of the French adult population living in urban areas with more than 100 000 inhabitants were interviewed, of whom 140 received the marginal version and 140 received the standard version. The respondents' charateristics are displayed in Table 1. As could be expected by the randomization procedure, there were no significant differences between the two groups in terms of age, education level, marital status, number of children < 15 living in the household, income, subjective health status, supplementary coverage. However, a significant difference was found in terms of gender distribution.

Results concerning explicit ranking of actors and WTP values

The distribution of actor ranking based on the explicit ranking question (part B of the questionnaire) is displayed in Table 2. In the whole sample SMUR/SAMU was ranked first by 34.3% of respondents. This is the most frequently first ranked option. The next most frequently first ranked programme was Imbulance/ Firemen, which was ranked first by 30% of respondents. The least preferred option was emergency outpatient centers. This ranking pattern holds in both the standard and marginal questionnaires. However the third, fourth and fifth most frequently first ranked options differ between questionnaires. In the marginal questionnaire, the third most frequently first ranked programme was emergency units in hospital while SOS and duty doctors came next equal. In the standard questionnaire, SOS doctors was the third most frequently first ranked option, followed by hospital emergency units and physicians on duty. The chi-squared test of differences in the distribution of respondents' answers to the ranking question revealed no significant differences between the standard and marginal questionnaires.

Table 3a shows mean and median WTP values for each actor in the marginal and standard questionnaire. In both questionnaires, the outpatient emergency centers had the lowest mean WTP (respectively 41 and 26 euros) and the paired t-tests all suggest that this actor is significantly less preferred than any other actor (Table 3b). In both questionnaires SAMU/SMUR had the highest mean WTP, respectively 103 and 41 euros. However the difference was not significant with Imbulance/Firemen in the marginal questionnaire and the difference was not significant either with SOS doctors and doctors on duty in the standard questionnaire. Then the standard questionnaire did not exhibit any significant difference between imbulance/firemen , SOS doctors, doctors on duty, and hospital emergency units. In the marginal questionnaire, firemen/imbulance was significantly preferred to SOS doctors, doctors on duty, and hospital emergency units but there were not significant differences between these three latter options.

Mean WTP values for all types of care were significantly higher in the marginal questionnaires. Around 17% of respondents declared very small (< 5 euros) WTP for

all six options (17.14 % in the marginal questionnaire and 17.90% in the standard questionnaire).

Assessing the consistency between explicit and implicit ranking

Econometric results are displayed in Table 4. Column 1 (*resp* 2) displays the results of the tobit model based on the standard (*resp* marginal) approach. The results of the ordered probit model based on the explicit ranking are shown in column 3[2].

Very interestingly, controlling for respondents' characteristics, the declared WTP based on the marginal approach provides the same ranking of actors as the explicit ranking, i.e. SAMU/SMUR and imbulance/firemen are significantly preferred to SOS doctors; SOS doctors is significantly preferred to doctors on duty and outpatient emergency centers; the evaluation is not significantly different between SOS doctors and hospital emergency units. The standard approach is only partially consistent with explicit ranking and proves unable to differentiate between the five most preferred actors. Hence our results suggest that the marginal approach greatly improves the consistency with the explicit ranking of options in comparison to the standard approach.

Furthermore the results also show that individuals with higher income are significantly more likely to declare higher WTP in the marginal approach. This result is not highlighted by the standard approach. This finding also confirms that the marginal approach performs well.

We are unclear as to what we can say concerning the health status variable in the marginal approach.Those with poor health status and those with excellent health status are more likely to declare higher WTP in the marginal approach than those with good health status. One possibility is that this can be accounted for by the fact that those with poor health status are more likely to need emergency care and that excellent health status captures an income effect or eduction/information effect.

Using the results in a CB analysis

[2]Note that the ordered probit model is run on a variable for which the preferred option is equal to one and the least preferred option is equal to 6. This is the reason why the signs of the coefficients should differ between column 3 and 2.

Table 6 provides us with the average cost per visit for each actor and indicates the number of French households as well as the number of yearly emergency cases in France.
This makes it possible for us to compare SOS doctors versus SAMU/SMUR as an illustration of the use of our results in a CB analysis.
Based on the marginal approach, the benefit are equal to 49.3 * 12 * 25 689 000 =15 197 612 400, and the costs are equal to 129.77 * 15 000 000 = 1 946 550 000. Hence the cost benefit ratio is equal to: 15 197 612 400/1 946 550 0000=7.8.

5. Discussion and conclusion

Our interpretation of the above results is that, in broad terms, the marginal approach improves consistency with the explicit ranking of actors and provides evaluation results that are fully in line with those of the explicit ranking question, thus suggesting that the use of WTP based on a marginal approach provides results that can be used in priority setting contexts.

However, the arguments presented above rest on the implicit assumption that WTP rankings and explicit preference rankings should correspond. It is important to point out, however, that this expected correspondence is based on the premise that the underlying structure of preferences is the same when one is asked the WTP questions and one is asked the explicit ranking questions. Among other things, this rests on the ranking derived from WTP values not being influenced by the respondent having to give up money, relative to the explicit ranking where no such sacrifice is involved.

In terms of robustness checks:

- We have excluded from the regressions those with very small WTP values for all six options. Hence we looked at the characteristics of those with very small WTP for each of the 6 actors.
- Furthermore we also checked whether our results could be driven by the highest income group. We computed mean WTP for each actor by three income groups (Table 7). It turns out that the highest WTP are to be found in

the intermediate group, thus suggesting that the highest income groups are not necessarily driving the results.

- Based on the preference elicitation procedure described in the data section, the maximum WTP value was identified in the following way. Going up (down) the scale, the maximum WTP was considered to be the last (first) value to which the respondents said "yes". As a robustness check, we also considered the possibility that, going up the scale, the maximal WTP was a (unobserved) number between the last value to which the respondents said "yes" and the next one to which they will have said "no". Hence, an interval data regression model was estimated in the marginal and standard questionnaires as an alternative specification to the tobit model based on equation (2). The results were not qualitatively different from those exhibited in columns 2 and 3 of Table 5.

There has also been recent criticism that many WTP applications in health are methodological and do not follow through to full CBAs. We have tried to illustrate how we would follow through to this stage of analysis. We would welcome comments on this as well as the theoretical basis of what we have done and the analytical processes we have gone through (such as the calculation of WTP, [especially when using the marginal approach], consistency tests and econometric analyses).

On the application:

Our study contributes to the very few papers offering an economic evaluation of out-of-hours and emergency care (See Hack and Pruckner (2006) for the evaluation of emergency care provided by the Red Cross in Austria) See a couple of papers of Van Uden.

Some limitations of our study have to be acknowledged:

- One caveat of our study is that Private imbulance/firemen are considered altogether.
- In this study we have not considered emergency situations for specific diseases. The ranking that we have may be different if we focus on specific

diseases. A follow up study to the present study would be very interesting in this respect.

References

Boardman AE, Greenberg DH, Vinning AR and Weimer DL (1996). Cost–benefit Analysis: Concepts and Practice. Prentice-Hall, New Jersey.

Carson RT, Flores NE and Meade NF (2000). Contingent valuation: controversies and evidence. *Environmental and Resource Economics* 19, 173–210.

Donaldson C (1999) Valuing the benefits of publicly-provided health care: does 'ability to pay' preclude the use of 'willingness to pay'? *Social Science and Medicine* 49, 551–563.

Hackl F, Pruckner GJ (2006). Demand and supply of emergency help:An economic analysis of Red Cross services. *Health Policy* 77, 326–338

Lakhani (2008)

Luchini S, Protière C, Moatti JP (2003). Eliciting several willingness to pay in a single contingent valuation survey: application to health care. *Health Economics* 12, 51–64.

Olsen JA (1997). Aiding priority setting in health care: is there a role for the contingent valuation method? *Health Economics* 6, 603-612.

Olsen JA, Donaldson C (1998). Helicopters, hearts and hips: using willingness to pay to set priorities for public sector health care programmes. *Social Sciences and Medicine* 46, 1-12.

Olsen JA, Kidholm K, Donaldson C, Schackley P (2004). Willingness to pay for public health care: a comparison of two approaches. *Health Policy* 70, 217-228.

Olsen JA, Donaldson C, Shackley P and the EuroWill Group (2005). Implicit versus explicit ranking: on inferring ordinal preferences for health care programmes based on differences in willingness-to-pay. *Journal of Health Economics* 24, 990-996.

Payne JW, Schkade DA, Desvousges WH, Aultman C (2000). Valuation of Multiple Environmental Programs. *Journal of Risk and Uncertainty* 21(1),95-115.

Schkade D, Payne J (1994). How people respond to contingent valuation questions: a verbal protocol analysis of willingness to pay for an environmental regulation. *Journal of Environmental Economics and Management* 26, 88-109.

Shackley P, Donaldson C (2002). Should we use willingness to pay to elicit community preferences for health care? New evidence from using a marginal approach. *Journal of Health Economics* 25, 445-460.

Smith RD (2003). Construction of the contingent valuation market in health care: a critical assessment. *Health Economics* 12, 609-628.

Van Uden CJT, Winkens RAG, Wesseling G J et al. (2003). Use of out-of-hours services: a comparison between two Organisations. *Emerg Med J* 20,184–187.

Van Uden CJT, Crebolder HFJM (2004). Does setting up out of hours primary care cooperatives outside a hospital reduce demand for emergency care? *Emerg Med J* 21, 722–723

Van Uden CJT, Ament A, Voss G et al. (2006). Out-of-hours primary care. Implications of organisation on costs. *BMC Family Practice* 7, 29.

Table 1: Descriptive statistics concerning the study population

	All	Standard questionnaire	Marginal questionnaire	p*
	n = 280	n = 140	n = 140	
Age (mean)	50.1	50.9	49.4	0.46
Male (%)	45.7	39.3	52.1	0.03
Secondary school or short professional track (%)	31.4	32.1	30.7	0.60
High school degree (Baccalaureat)	21.4	24.3	18.6	
Short university studies (2 yrs) or long professional track (%)	15.7	14.3	17.1	
University degree higher than bachelor level (%)	31.4	29.2	33.5	
Individual is married or living in couple (%)	57.1	57.9	56.4	0.81
Number of children < 15 living in the household (mean)	0.4	0.4	0.4	0.95
Income (1-10) (mean)	5.7	5.8	5.6	0.64
Very good self assessed health (%)	30.0	30.0	30.0	0.83
Good self assessed health (%)	47.9	49.3	46.4	
Poor self-assessed health (%)	22.1	20.7	23.6	
Individual has supplementary health insurance coverage (%)	90.7	90.7	90.7	1.00
All statistics are weighted				
* Test of difference between the standard and marginal versions				
(student test for continuous variables, chi2 for categorical variables)				

Table 2: Distribution of option ranking

		1st	2nd	3rd	4th	5th	6th	p*
All questionnaires	SMUR/SAMU	34.3	32.9	16.1	8.6	5.4	2.9	
(n = 280)	SOS doctors	11.8	16.4	22.1	23.9	17.5	8.2	
	Doctors on duty	8.2	6.8	14.6	22.9	36.4	11.1	
	Imbulance/ Firemen	30.0	25.7	22.9	11.1	6.4	3.9	
	Hospital emergency units	12.1	16.1	20.7	25.7	18.9	6.4	
	Outpatient emergency centers	3.6	2.1	3.6	7.9	15.4	67.5	
Marginal questionnaire	SMUR/SAMU	35.00	32.86	14.29	10.00	5.00	2.86	
(n = 140)	SOS doctors	8.57	15.00	21.43	25.00	18.57	11.43	
	Doctors on duty	8.57	4.29	18.57	22.86	32.86	12.86	
	Imbulance/ Firemen	28.57	25.00	24.29	9.29	9.29	3.57	
	Hospital emergency units	13.57	20.71	18.57	25.71	16.43	5.00	
	Outpatient emergency centers	5.71	2.14	2.86	7.14	17.86	64.29	
Standard questionnaire	SMUR/SAMU	33.57	32.86	17.86	7.14	5.71	2.86	0.93
(n = 140)	SOS doctors	15.00	17.86	22.86	22.86	16.43	5.00	0.24
	Doctors on duty	7.86	9.29	10.71	22.86	40.00	9.29	0.20
	Imbulance/ Firemen	31.43	26.43	21.43	12.86	3.57	4.29	0.42
	Hospital emergency units	10.71	11.43	22.86	25.71	21.43	7.86	0.25
	Outpatient emergency centers	1.43	2.14	4.29	8.57	12.86	70.71	0.33

*khi2 test of differences in the distribution of respondents's answers to the ranking question between the standard and marginal questionnaires

Table 3a: Mean and median WTP by actor in the marginal and standard questionnaires

		SMUR/ SAMU	SOS doctors	Doctors on duty	Imbulance/ Firemen	Hospital emergency units	Outpatient emergency centers
Marginal version	mean	103.16	66.11	59.47	97.91	69.18	41.86
	std	130.66	89.97	83.92	127.16	77.31	74.88
	median	57.50	30.00	27.50	47.50	42.50	10.00
	% of zeros	19.29	25.71	26.43	19.29	19.29	35.71
Standard version	mean	41.16	36.65	37.62	34.76	32.26	26.04
	std	46.74	41.02	42.69	40.96	38.21	34.51
	median	30.00	25.00	20.00	20.00	20.00	10.00
	%of zeros	27.86	25.00	27.86	28.57	32.14	40.00

Table 3b: Test of comparison in WTP for each possible pair of actors

	Mean comparison test (1)		Median comparison test (2)	
	Marginal questionnaire	Standard questionnaire	Marginal questionnaire	Standard questionnaire
SMUR/SAMU versus SOS doctors	<0.01	0.19	0.04	0.90
SMUR/SAMU versus doctors on duty	<0.01	0.33	0.06	0.81
SMUR/SAMU versus imbulance/firemen	0.22	0.07	0.55	0.34
SMUR/SAMU versus hospital emergency units	<0.01	<0.01	0.09	0.19
SMUR/SAMU versus outpatient emergency centers	<0.01	<0.01	<0.01	0.01
SOS doctors versus doctors on duty	0.15	0.77	0.81	0.81
SOS doctors versus imbulance/firemen	<0.01	0.52	0.12	0.55
SOS doctors versus hospital emergency units	0.52	0.22	0.28	0.34
SOS doctors versus outpatient emergency centers	<0.01	<0.01	0.12	0.02
doctors on duty versus imbulance/firemen	<0.01	0.32	0.15	0.72
doctors on duty versus hospital emergency units	0.06	0.06	0.34	0.47
doctors on duty versus outpatient emergency centers	0.01	<0.01	0.12	0.04
imbulance/firemen versus hospital emergency units	<0.01	0.42	0.91	0.72
imbulance/firemen versus outpatient emergency centers	<0.01	<0.01	<0.01	0.09
hospital emergency units versus outpatient emergency centers	<0.01	0.03	<0.01	0.18

(1) paired t-test
(2) Pearson chi-squared test of the equality of the medians

Table 4: Descriptive statistics concerning fully consistent / partially consistent / inconsistent answers

To be completed

Table 5: Regression results

	Explained variable		
	WTP in standard questionnaire (1)	WTP in marginal questionnaire (1)	Explicit ranking (2)
SAMU/SMUR	4.6	49.3**	-0.9**
SOS doctors	*ref*	*ref*	*ref*
Doctors on duty	0.72	-10.2*	
Imbulance/ Firemen	-4.6	41.7**	-0.7**
Hospital emergency units	-8.7	3.2	-0.07
Outpatient emergency centers	-18.2**	-49.9**	1.6**
Male	15.8*	25.3	0.001
Age 18 - 30	20	58.4*	-0.005
Age 31 - 50	12.1	34.7	-0.008
Age 51 - 65	8	35.5	0.0004
Age > 65	*ref*	*ref*	*ref*
Very good health status	2.6	53.3**	0.002
Good health status	*ref*	*ref*	*ref*
Poor health status	-0.3	87.5**	-0.0003
Income	-1.7	9.3**	-0.001
n	690	696	1680
(1) Tobit models clustering for individuals			
(2) Ordererd probit models clustering for individuals (1 = first preferred option … 6 = sixt preferred option)			
* significant at 0.10 level, ** significant at 0.05 level			

Table 6: Average cost per actor per visit

	average cost per visit (€)
SMUR/SAMU	189.6
SOS doctors	59.83
Doctors on duty	
Private Imbulance	210.27
Firemen	90
Hospital emergency units	104.01
Outpatient emergency centers	70.89
Source: AREMIS study, published in Cahiers Hospitaliers, June 2007	
Number of households*	25689000
Number of yearly emergency cases*:	15000000
Source: INSEE (2009)	
Source: Cahiers Hospitaliers, June 2007	

Table 7: Mean WTP by income levels in the marginal approach

	SMUR/ SAMU	SOS doctors	Doctors on duty	Imbulance/ Firemen	Hospital emergency units	Outpatient emergency centers	Income distribution
net income < 1500	71.4	45.8	41.9	72.6	50.3	31.0	37%
net income 1500 - 3000	130.5	77.8	67.8	115.0	82.5	45.8	32%
net income > 3000	106.2	75.8	70.8	108.8	76.2	50.9	31%

Appendix 1

5 euros	100 euros
10 euros	110 euros
20 euros	120 euros
30 euros	130 euros
40 euros	140 euros
50 euros	150 euros
60 euros	160 euros
70 euros	170 euros
80 euros	180 euros
90 euros	More than 180 euros