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Abstract

Applications of willingness to pay (WTP) have shown the difficultly to discriminate between various options. This reflects the problem of embedding in both its specific sense, of options being nested within one another, and its more-general sense, whereby respondents cannot discriminate between close substitutes or between more-disparate rivals for the same budget. Furthermore, high proportions of reversals between WTP-value and simple preference based rankings of options are often highlighted. Although an incremental WTP approach was devised to encourage more differentiated answers and a higher degree of consistency among respondents, a theoretical basis for this approach has not been elucidated, and there is little evidence to show that this approach might indeed achieve greater consistency between explicit and implicit rankings inferred from WTP values.

We address both these issues. Following our theoretical exposition, standard and incremental approaches were compared with explicit ranking in a study assessing preferences for different French emergency care services. 280 persons, representative of the French adult population, were interviewed. Half received the incremental version, the other half the standard version. Results suggest that the incremental approach provides a ranking of options fully in line with explicit ranking. The standard approach was reasonably consistent with explicit ranking but proved unable to differentiate between the five most preferred providers, as predicted by theory. Our findings suggest that the incremental approach provides results which can be used in priority-setting contexts.

1. Introduction

Direct willingness to pay (WTP) methods remain controversial, partly because it involves monetary valuation of benefits. However, it could be argued that the real question is whether the validity of explicit WTP valuation methods can be improved.

The standard approach in the literature (e.g. Olsen and Donaldson (1998)) is to ask any given respondent about their WTP for each option at stake in an evaluation, with options being randomised to minimise sequencing effects. However inconsistent preference ordering when compared with simple rankings and the incapacity to discriminate between options (essentially, the result of embedding) led to an alternative, incremental, approach being proposed by Shackley and Donaldson (2002). However testing was inconclusive, and the authors underlined the need for more evidence. Furthermore, the approach's theoretical basis has never been delineated. This paper addresses both of these issues.

The empirical evidence provided in this paper regards the context of publicly-funded French emergency and out-of-hours services, through which several mutually exclusive forms of delivery are offered.

After providing the background to the development of the incremental approach and outlining a theoretical basis, we describe our test of the approach in the above emergency services context. We then outline the study results before discussing implications for the initial theory and future research and policy.

2. Background and proposed theory

2.1 The incremental approach

Values for 'intangibles', like health care, are difficult to validate since, by definition, they can rarely be confirmed through observing 'real world' market place behaviour. One alternative to such validation is to construct simple tasks, whereby survey respondents explicitly rank competing programmes, against which their WTP for each (and the ranking this implies) can be compared. Another practical reason for conducting such studies is the reality of publicly-funded goods such as health care. Multiple programmes compete for funds and consequently need to be assessed by every respondent (Boardman et al., 1996; Luchini et al., 2003). In practice, respondents are asked to rank various options in order of preference and to state a WTP for each in order to help the analyst elicit extra information about strength and direction of preference.

To use the WTP method to aid decision-making, an acceptable degree of convergence between respondents' stated rankings and rankings inferred from stated WTP values is a prerequisite. As an example of a perfectly valid method, an individual giving a ranking of three programmes as 1,2,3 might give WTP values for these three programmes of $100, $75 and $50 respectively. However, early results from a large 'EuroWill' project, funded by the European Commission in the health arena, demonstrated a lack of convergence in respondents' answers (Olsen and Donaldson, 1998; Olsen, 1997; Olsen et al., 2005). Indeed, they confirm results from studies in other areas of applied economics (Schkade and Payne, 1994), addressing embedding in its more-specific sense, of options being nested within one another. This embedding issue has continued to plague contingent valuation-based WTP estimation (Diamond and Hausman, 1994). Very most recently Hausman (2012) labelled such estimates as 'hopeless'. More generally, the inability of patients' and public's WTP values to

discriminate between various options has been highlighted in the context of the comparison of multiple programmes. Despite these adverse empirical results, WTP practitioners have defended the method, indicating that such problems are because of compromised study designs (Carson et al., 2000; Smith, 2003) and that WTP responses are typically influenced by the individual's reference point (Kahneman et al., 1991; Morrison, 2000). Despite this, no one has articulated an alternative theoretical basis for contingent valuation which incorporates reference points.

The incremental WTP approach was developed to overcome the above challenges faced by the EuroWill Project, by encouraging more differentiated answers and a higher degree of consistency among respondents (Shackley and Donaldson, 2002). Using a simple example from Shackley and Donaldson (2002), with the incremental approach, the hypothetical individual from above might give a value of $50 for his/her lowest-ranked programme, and then be asked how much more she/he would be willing to pay for his/her second-ranked programme. Matching the values above, we would expect the response to be $25 more (as $25+$50=$75). Although the incremental approach initially applied in EuroWill did not greatly increase convergence (Shackley and Donaldson, 2002), the number of partially consistent responses reported in previous papers indicated that further development of the method might show real potential (Olsen et al., 2005).

The survey reported below involved improvements on earlier work in three main ways. First, wording of earlier questionnaires may have led respondents to believe they were being asked to pay for all programmes in totality, leading them to come up against a perceived budget constraint when asked to value their highest-ranked programme. In the EuroWill survey, the incremental WTP questions were phrased as "How much more would you be willing to

contribute each year to expand the ……. programme compared to the ……. programme?". It was speculated that the term "compared to" may have led respondents to believe they were being asked to pay for all three programmes from their budget rather than any one programme (Shackley and Donaldson, 2002). To counter this, the term "compared to" was removed. In addition, attempts were made to make it more explicit to respondents that their 'budget' had not been diminished by any WTP values they may have stated for previous programmes.

Second, the purchase of moral satisfaction or warm glow could explain the persistence of inconsistencies in the EuroWill incremental survey (Kahneman and Knetsch, 1992). Moral satisfaction is purchased by stating a positive WTP amount for what the respondent regards as a good cause, the size of the contribution or amount of the good being of secondary importance, leading to an inability of WTP to discriminate between programmes. Although the incremental approach in EuroWill was designed to avoid this, every other programme was valued over and above the 'baseline' value given for the lowest ranked programme, therefore giving respondents greater opportunity to be inconsistent. In the survey reported below, each successive programme is valued over and above that ranked immediately below it. A potential criticism, of course, is that consistency is forced, although it could be argued, first, that such a basic test of rationality is a fundamental one for the method to pass and that, second, the incremental approach has never been compared in a head-to-head comparison with the more-conventional approach of asking for a total WTP for each competing option.

Third, respondents could perceive the ranking exercise and the WTP valuations as different processes. In the earlier survey using the incremental approach (Shackley and Donaldson, 2002), the ranking asked individuals to indicate how important they thought the programmes were (potentially causing respondents to take a societal perspective) while the WTP questions

focused on value (perhaps invoking a more individualistic perspective). This wording was amended with the intention of conveying the notion of individual value in both contexts. So, for ranking, the wording asked the respondent to:

> "place these programmes in order of how highly you value them starting with the one you like most. When doing this, concentrate on how much you value the proposed expansions and how you value preventing the proposed reductions from going ahead."

2.2 Theoretical framework

The incremental approach is built on the theory of reference dependent preferences (Schoemaker, 1982) which not only underlie the problem of embedding but also offer a potential solution.

According to this theory, we assume that an individual's response to a WTP question is influenced by their reference point. Referring to Figure 1, the policy maker's objective is to choose an efficient level of utility in h, where $h_i \in H$ is an exogenously determined level of health amenity available to an individual[1]. Agents also have preferences over $\boldsymbol{x}$, a vector of n consumption goods. While agents can vary their choices of consumption goods such that $x_n \in \boldsymbol{x}$, these choices are contingent on the level of h.

An individual's preferences are described by the utility function:

$$u(\mathbf{x}, h_i; h_0)$$

where h_i is the (exogenously determined) level of the amenity under evaluation, h_0 is the agent's reference level of the amenity (perhaps their status quo level of medical treatment), and $h_i,\ h_0 \in H$. We assume $u(\mathbf{x}, h_i; h_0)$ to be increasing, continuous, concave, and

[1] In line with our empirical work, the theoretical section is devised based on health care goods. However it could be applied to any other types of goods (environment…)

differentiable in $\mathbf{x}$ and h_i. To capture the role of reference dependency, we assume that the marginal utility of h_i increases in h_0 as follows:

$$\frac{\partial^2 u(\mathbf{x}, h_i; h_0)}{\partial h_i \partial h_0} > 0$$

Thus, while $u(\cdot)$ is concave in h_i, its concavity is relative to the reference level h_0. This implies that small improvements in h above or below the reference level yield higher marginal changes in utility, with marginal changes declining for subsequent increases or decreases beyond the reference level.

Figure 1 illustrates the reference dependent utility function as a function of *x* (which may be regarded as the valuation numeraire) and *h*. Reference dependency implies that the individual places greater value on marginal changes around their reference point. Accordingly, if they are initially at (x_0, h_0), with preferences given by u_0, an exogenous increase in h to h_1 will shift their indifference curve to u_0' (since the new level of health amenity is given, the individual cannot trade from (x_0, h_1) to a preferred bundle). However, if h_1 becomes the agent's new reference point, their indifference curve is represented by u_1 rather than by previous indifference mapping u_0'. Given their new reference point, the individual now values marginal changes around h_1 (measured by the slope of u_1 at h_1 more than they did when valuing changes from their old reference point of h_0 (measured by the slope of u_0' at h_1). The crossing of indifference curves at the point (x_0, h_1) does not imply that the individual is indifferent about bundles along u_0' and u_1. Each of these indifference curves is distinct and defined for a different reference level *h*.

Turning to reference dependency as part of the problem, let us assume that a policy maker is contemplating changes which would raise the level of *h* from h_0, one set raising the level to h_1 , another to h_2. We interpret $WTP\ (h_i\ , h_0) \in [0, y]$ as the income the individual is willing

to forgo for an increase in health amenity from h_0 to h_i , such that his utility remains unchanged from when only h_0 was available. If WTP is considered a metric for individuals' preferences, a policy maker can use the reported WTP values to determine the optimal h* policy. This would be calculated via the index:

$$\beta(h_2, h_1; h_0) = \sum_{i \in I_2} WTP\ (h_2; h_0\ )\ - \sum_{i \in I_1} WTP\ (h_1; h_0)$$

No attempt is made here to discern individuals' preferences between h_1 and h_2. Each is valued relative to the reference point, h_0. In a sense, they will then perceive the opportunity cost of each of h_1 and h_2 to be h_0, i.e. the same cost. Figure 2 shows the measure $\beta(\ h_2,h_1;h_0)$ for an individual preferring h_2 to h_1. With *x* as income (or the numeraire),

$$WTP\ (h_1; h_0) = x_0 - x_1 \text{ and } WTP\ (h_2; h_0) = x_0 - x_2.$$

$\beta(h_2, h_1; h_0)$ is represented by the difference x_1 - x_2, which is small and becomes smaller the larger the improvement in both h_1 and h_2 over h_0. Accordingly one could infer that the individual is effectively indifferent about the two policy options, and this is essentially the embedding problem.

Employing reference dependency as part of the solution, Figure 3 illustrates the incremental approach introduced in the previous sub-section. Here, with h_1 as the reference point, preferences are now described by u_1, and the increase to h_2 shifts the individual's indifference curve to u_1'. The vertical difference between the curves at the relevant point, represented by x'_1-x'_2, is greater than the corresponding gap in Figure 2 and our β index now provides a more-discriminating result in terms of strength of preference.

Empirically, all of the above would imply that:

- when asked to value several competing policy alternatives, respondents are likely to compare each of these against the status quo (or 'do nothing') option;
- especially when these policy options are close substitutes, the respondent is essentially evaluating policy variations against a common opportunity cost, and, thus, a non-discriminating set of valuations, or β index, will arise;
- when defining a new reference point, which might be based on any given respondent's least preferred form of the amenity, the more discriminating β index will be obtained.

We illustrate this in the study of emergency services in the following two sections.

3. Data

3.1 Emergency and out-of-hours medical services in France

France has six service alternatives (or 'providers') in emergency and out-of-hours medical assistance. Mobile and fixed services are distinguished in Table 1. The former come to the patient's location and include SAMU/SMUR, SOS Doctors, physicians on duty, ambulance/firemen. For fixed services, patients travel to emergency care units including outpatient emergency centres and emergency hospital units. All six services are financed by

the social health insurance system. In France access to emergency or out-of-hours medical care is regulated. Typically, the telephone-based medical dispatcher assesses how serious the emergency call is, dispatching relevant medical resources or requesting the caller to go to an emergency unit. Although this system was implemented in order to ensure the best allocation of scarce resources, the question of how to optimize provision of emergency and out-of-hours care is still an open one and can be informed by data on public preferences for the different provision services. We address this issue by presenting a study of WTP for the competing service providers. Accordingly, it also contributes to the very few papers currently offering an economic evaluation of such care (Hackl and Pruckner, 2006; Van Uden et al., 2003).

3.2 Survey

A telephone survey, carried out by the polling Institute TNS Sofres from July 17th to July 27th 2009, assessed preferences for these different emergency services. A representative sample of the French adult population living in urban areas with > 100 000 inhabitants was selected[2]. Respondents were randomly assigned either a standard or an incremental questionnaire, thereby defining two study samples and allowing our proposed theory to be tested.

3.3 Questionnaires

Both questionnaires were divided into four sections.

Introductory information was first provided to the respondents. The interviewer described the characteristics of emergency and out-of-hours medical "providers" (as described above) so that respondents would have common knowledge of each. The interviewer also told the

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

respondents to assume that the costs of the six providers were equal when answering the questionnaire. Respondents then ranked the providers in order of preference, from their most (ranked 1) to their least (ranked 6) preferred provider. In the third section of the questionnaire, respondents were asked to imagine that financing mechanisms for all six providers had been changed and that the necessary resources would have to be paid for 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. Given this imaginary situation, respondents were asked what their maximum WTP would be in terms of such monthly insurance premia. In the fourth section of the questionnaires, socio-demographic information and information concerning health status and supplementary coverage was collected. Respondents were also asked whether they had called any of the six emergency providers during the previous year.

The WTP questions in the third section of both questionnaires differed. In the standard questionnaire, respondents were asked about the maximum premium they would pay for each emergency and out-of-hours provider. The order of the six corresponding questions was randomized to avoid sequence effects (Payne et al., 2000). In order to prevent respondents 'adding up' their WTP amounts, thereby paying less for later options, simply because of budget constraints, respondents had to imagine they were first given back the amount they said they would pay for the previous provider before valuing the subsequent one. In the incremental questionnaire, after the ranking exercise in the second section, the lowest ranked provider was selected for the first WTP valuation. This became the reference point for each respondent, beyond which each successive programme is valued over and above that ranked immediately below it. Respondents were asked about the maximum premium that they would pay for the provider ranked sixth and then asked how much more they would pay for the fifth-

ranked provider over and above that ranked sixth, for the fourth over and above that ranked fifth, and so on. Again, they were told to imagine they were given back the amount they were willing to pay for the previously valued provider.

The following method was used to elicit WTP values: 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). These amounts were chosen to coincide with the range of the most popular complementary health insurance products offered when the study was carried out. If the respondents said that this was an amount they would definitely pay, the interviewer then cited the next highest amount until the respondents said no or until the category "more than 180 euros" was reached. If they answered no to the first cited amount, then the interviewer cited the next lowest amount until the respondents said yes or until "5 euros" was reached. If the respondent said "no" to "5 euros", this was treated as a zero value. The last (first) value to which the respondents said "yes", going up (down) the scale, was defined as maximum WTP. The same method was used to elicit incremental WTP values, except for the fact that we used a range of smaller amounts (5 – 100 euros).

An *ex ante* WTP approach (i.e. where neither the need for care nor the outcomes are known for certain) was chosen over an *ex post* WTP approach (where respondents' conditions, but not necessarily the outcome, are known for certain) because of the emergency-based context. In case of extreme emergencies WTP may converge to infinity if respondents are made to imagine that they suffer from acute pain. To date *ex ante* type approaches have used either insurance premiums or taxation contributions (Olsen et al, 2004). We opted for the former because most French people pay premiums for complementary health insurance coverage. Furthermore, the idea of a tax increase might have induced many protest answers.

3.4 Statistical and econometric methods

Empirical analysis tested the validity of the incremental approach, in terms of (*i*) whether it improved consistency between respondents' explicit provider ranking and the ranking implied by their WTP values; (*ii*) whether it made it possible to differentiate between the various providers.

The distribution of ranking was computed for each type of emergency service in both the incremental and standard questionnaires. Chi-squared statistics tested for differences in the distribution of respondents' answers to the ranking question between both questionnaire types.

In incremental questionnaires, WTP for each provider was computed on the basis of incremental answers. For example, if SOS doctors was the 5th preferred provider, then WTP for SOS doctors = WTP for the sixth preferred provider plus additional WTP for SOS. If SOS was the 4th preferred provider, then WTP for SOS = WTP for the sixth preferred provider plus additional WTP for the 5th preferred provider + additional WTP for SOS. Mean and median WTP values were computed for each provider in both questionnaires. Within each study sample, tests of comparison for WTP for each possible pair of providers were performed using a paired Student t-test and the Pearson chi-square test of the equality of the medians. For each provider, differences in WTP were also tested between the standard and incremental questionnaires.

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

First, we defined three levels of consistency: full consistency, partial consistency and inconsistency (see Appendix 2). These definitions were applied for each provider at the level of each individual respondent. For each provider we computed the number of cases when answers were fully consistent, partially consistent or inconsistent. In incremental questionnaires, there are no inconsistent answers, by construction.

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

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

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

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

WTP_{ij}^{*} is the maximum WTP of individual i for provider j. Some WTP values may be left-censored (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" was used as the reference provider. ε_{ij} and e_{ij} are assumed to be normally distributed.

We tested the assumptions of normality and homoscedasticity in the Tobit models as suggested by Cameron and Trivedi (2009). We used the cluster option in all regressions because each respondent assessed all six emergency providers.

Models were run in the incremental and standard questionnaire subsamples. The estimations provided us with a ranking of providers for each questionnaire type and each preference question (implicit ranking based on WTP or explicit ranking). The extent of consistency between the rankings of providers obtained in equation (2) and the ranking based on equation (1) made it possible to assess whether the incremental questionnaire improved consistency with explicit ranking or not.

All regressions were run excluding the individuals with very small (< 5 euros) answers for all six options. As is usual in contingent valuation studies, this was meant to exclude protest answers (Dziegielewska and Mendelsohn, 2007).

4. Results

4.1 Descriptive statistics

Two hundred and eighty people representative of the adult French population living in urban areas with more than 100 000 inhabitants were interviewed. Half received the incremental version, the other half the standard version. Respondents' characteristics are displayed in Table 2. The average age was 50 years old. Twenty-two percent of respondents assessed their health status as poor. One third had used at least one of the six emergency providers in the previous year. No significant differences were observed between the two groups in terms of age, education level, marital status, number of children under 15 years old in the household, income, subjective health status and having supplementary coverage. However, a significant difference was found in terms of gender distribution, with fewer male respondents in the standard questionnaire.

4.2 Results concerning explicit ranking of providers and WTP values

Table 3 shows the distribution of provider ranking based on the explicit ranking question. Overall, the most frequently first ranked provider was SMUR/SAMU (34.3% of respondents). The next most frequently first ranked provider was ambulance/firemen (30%). The least preferred provider was emergency outpatient centres. This pattern was similar for both questionnaires. However the third, fourth and fifth most frequently first-ranked options differed between questionnaires (Table 3). The chi-square test of differences in the distribution of respondents' answers to the ranking question revealed no significant differences between both questionnaire types.

Table 4 shows mean and median WTP values for each provider in the two questionnaires. In both, outpatient emergency centres had the lowest mean WTP (42 (incremental) and 26 euros (standard), respectively). Paired Student t-tests all suggest that this provider was significantly less preferred than any other (Table 5). In both questionnaires SAMU/SMUR had the highest mean WTP, 103 and 41 euros, respectively. However the difference between SAMU/SMUR and ambulance/firemen was not significant in the incremental questionnaire. The same was true for the differences between SAMU/SMUR and SOS doctors and between SAMU/SMUR and doctors on duty in the standard questionnaire. Furthermore, the standard questionnaire did not exhibit any significant difference between ambulance/firemen, SOS doctors, doctors on duty and hospital emergency units. However, in the incremental questionnaire, ambulance/firemen was significantly preferred to SOS doctors, doctors on duty, and hospital emergency units but no significant differences were observed between these three providers.

Mean WTP values for all types of care were significantly higher in the incremental questionnaires. Table 4 indicates that the lowest WTP in the incremental group was higher

than the lowest in the standard group, which may indicate some sort of bias in one or other of the groups. To investigate this further, we examined, for each provider, the number of times it was ranked 5th or 6th, and compared WTP values across incremental and standard groups in those situations[3]. This analysis was repeated for situations in which each provider was ranked 1-4. Looking at the results of this analysis in Table 6, for the least preferred providers (ranked 5-6), the mean WTP is similar in the incremental and standard versions (except for hospital emergency units), while the mean WTP is substantially higher in the incremental questionnaire for options ranked 1-4. This may provide further evidence that respondents found it more difficult to discriminate between various options in the standard questionnaire. Approximately 17% of respondents declared very small (< 5 euros) WTP for all six options (17.14 % and 17.9% in incremental and standard questionnaires, respectively).

4.3 Assessing the consistency between explicit and implicit ranking

Descriptive statistics concerning the consistency between explicit and implicit ranking are displayed in Table 7 for each provider. This shows the match between the placement of a provider in respondents' rank orderings with its placement in a ranking implied from WTP values. In the standard questionnaire, fully consistent and partially consistent ranking ranges from 13 to 26%, and from 24 to 43%, respectively. For each provider, the percentage of fully or partially consistent answers is less than 50%, except for outpatient emergency centres (60%). In the incremental questionnaire, fully consistent ranking ranges from 77 to 88%, the remainder representing partially consistent answers. Considering the match between respondents' full ranking path over the six providers and their full rankings implied by their WTP values, 49% of responses were fully consistent in the incremental questionnaire, while 0% and 15% of responses were fully and partially consistent, respectively, in the standard

[3] We bundled ranks 5 and 6 in order to have enough answers in this least preferred category. We also looked at rank 6th versus ranks 1-5 and the results are not qualitatively different from those displayed in Table 6.

questionnaire. Overall, these results suggest that the incremental approach greatly improves consistency.

Table 8 displays econometric results. The results based on equations (1) and (2)[4] are shown for the standard and incremental subsamples. Controlling for respondents' characteristics, the ranking of providers provided by the explicit ranking question (equation 1) is the same in the standard and incremental subsamples. Very interestingly, the declared WTP based on the incremental approach provides the same ranking of providers as the explicit ranking, i.e. SAMU/SMUR and ambulance/firemen are significantly preferred to SOS doctors. The latter is significantly preferred to doctors on duty and outpatient emergency centres. 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 providers. Hence, our regression results suggest that the incremental approach is fully consistent with the explicit ranking of options and makes it possible to discriminate between various options while the standard approach is only partially consistent and cannot discriminate between the various options.

The results also show in the incremental approach, but not the standard one, that individuals with higher income were significantly more likely to declare higher WTP. This also confirms that the incremental approach performs well. Those with "poor" or "excellent" health were more likely to declare higher WTP in the incremental approach than those with "good" health. One possible reason for this is the fact that those with poor health were more likely to need emergency care while having excellent health may capture an income effect and/or an education/information effect. This hypothesis is supported by the fact that those with excellent

[4]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 differ between columns 1 and 2.

health did in fact have a significantly higher income level ($p < 0.01$) and were significantly more likely to have a university educational level ($p = 0.01$). We also found that those with supplementary coverage were significantly more likely to declare higher WTP for emergency services in the incremental approach. This is in line with the phenomenon of moral hazard in the French context (Buchmueller et al., 2004) and again supports the validity of the incremental approach. Finally, the results show that those who had used emergency care during the previous year declared lower WTP values in the incremental questionnaire. This may be attributed to the fact that some of the users were dissatisfied with the care they were provided. The questionnaire also investigated whether those who used emergency services during the previous year were very satisfied/ satisfied/ not satisfied with the care provided to them. Only those users who were satisfied/not satisfied declared lower WTP than those who had not used any emergency service providers. This pattern was found for both questionnaires but was only significant in the incremental one.

The results of the tests reported in Table 8 (tobit models) suggest that we cannot reject the hypothesis of normality or that of homoscedasticity in both versions of the questionnaire.

5. Discussion and conclusion

We outline a theoretical basis for comparing the incremental and standard WTP approaches, using explicit rankings as a common comparator. In broad terms, the incremental approach improves consistency with explicit ranking and provides evaluation results (i.e. ranking of providers) fully in line with those of explicit ranking, while the standard approach proves incapable of differentiating between the five most preferred providers. Our empirical findings are also in line with our theoretical framework which shows that, in the standard approach, WTP values for each provider, predominantly reflecting improvements over the status quo,

fail to discriminate among alternative providers. The incremental approach, which redefines the reference point from which the response is measured, gives a more discriminating value for the intensity of preferences. These results suggest that an incremental WTP approach seems to perform better than its standard counterpart in terms of capturing preferences and provides results which can be used in priority-setting contexts.

We performed various robustness checks on our results.

First, Table 9 shows the characteristics of individuals excluded from regressions (i.e. with very small WTP for each of the six options). No significant differences were found with other respondents' characteristics in terms of gender, education, marital status, family structure, health status, income and use of emergency services in the previous year. However, excluded people were significantly older. None was aged 18 – 30 and 38% were over 65. Furthermore, they were significantly more likely to be covered by supplementary health insurance. Because the elderly may need emergency care more often and because those with supplementary coverage are expected to express higher WTP values (moral hazard), these results suggest that excluded individuals were most probably not expressing valid preferences perhaps because they may have misunderstood the exercise or may have expressed protest answers.

Second, we checked whether our results could have been biased by the highest income group. We computed mean WTP values for each provider in three income groups (Table 10). The highest WTP values were to be found in the intermediate group, thus suggesting that the highest income groups did not necessarily drive the results.

Third, we tested the sensitivity of our results to the identification choice of the WTP value. Based on the preference elicitation procedure, the maximum WTP value was identified as follows: 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 considered the possibility that, going up the scale, the maximum WTP was an unobserved number between the last value to which the respondents said "yes" and the next one to which they would have said "no". Hence, an interval data regression model was estimated in the incremental 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 4 of Table 8.

Our study has several limitations. First, the questionnaire does not allow equal ranking in the explicit ranking question. It can be argued that we forced the respondents to make strong rankings. However, this is exactly the type of choice that individuals make on a daily basis when they must prioritize between possible expenditures. Despite this, some people may still have no preference between two options. This possibility was allowed for in the WTP questions and was defined as a "partially consistent answer". The percentage of partially consistent answers is only around 20% (except for outpatient emergency centres in the standard questionnaire) which suggests that most people indeed make strong rankings. This latter is also confirmed by the fact that the ranking of providers provided by the explicit and implicit ranking question is the same in the incremental questionnaire.

Second, it may be argued that the incremental approach forces consistency between explicit and implicit rankings. However, the key contribution of this study was to give WTP its 'best chance' to work, in that, if the incremental approach had not greatly improved consistency, it

could have been regarded as invalid, and would have represented a serious blow to the validity of WTP methods. This was not the case here.

Third, as already mentioned in the results section, mean WTP values were higher in the incremental questionnaires. This is in line with our theoretical framework and with previous studies using the incremental approach (Shackley and Donaldson, 2002). This raises the question of which WTP values to use in a cost benefit analysis, i.e. whether to use WTP values based on the incremental or standard approach. Based on the theory and results outlined here, we would lean towards the incremental approach. Both approaches should be followed in future work to gather more data on the extent to which predicted differences matter.

It has to be acknowledged that our comparison between explicit and implicit ranking is based on the implicit assumption that WTP rankings and explicit preference rankings should correspond. However, this expected correspondence is based on the premise that the underlying structure of preferences is the same when one is asked the explicit ranking questions and when asked WTP questions. Among other things, this is based on the fact that the ranking derived from WTP values is not influenced by the respondent having to give up money, unlike explicit ranking where no such sacrifice is involved. It is also implicitly assumed that further reflection (as revealed by WTP values in our study) is not different from initial thinking (provided by the explicit ranking question in our study). However, our context does not make it possible to investigate this.

In the meantime, we have displayed, both theoretically and empirically, the potential to overcome the major problem of embedding in contingent valuation studies.

Acknowledgments

We would like to acknowledge colleagues at the Joint Meeting of UK and French Health Economists, Aix en Provence, 11-13th January 2012, and, in particular, Stephen Birch of McMaster University. Although the term 'marginal approach' to contingent valuation was coined in earlier works of Donaldson and colleagues in the context of trying to get specific groups of patients involved in preference elicitation exercises to focus on differences between close substitutes, i.e. different ways of treating the same problem, Birch pointed out that the use of this term is problematic, in that it does not reflect the strict interpretation of the term 'marginal' in economic theory. Accordingly, we refer to the term 'incremental' to emphasise the continued focus of this method on the more general issue of differences between options.

Conflicts of interest

There are no potential conflict of interest

Ethics

The research was approved by ethic committee at ESSEC Business School

Appendix 1: Possible amounts cited by the interviewer

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

Appendix 2: Definition of fully consistent, partially consistent and inconsistent answers

Fully consistent answers, for a given provider, were those for which the explicit ranking was identical to the implied WTP ranking (e.g. SOS doctors were the second most preferred provider and values in monetary units were 60, 50, 30, 20, 40, 10 for respectively SAMU, SOS doctors, doctors on duty, ambulance/firemen, hospital emergency units, outpatient emergency centres. This means that SOS doctors were also ranked second, based on the ranking derived from WTP values)

Partially consistent answers for a given provider 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. explicit ranking ranked SAMU/SMUR as the fourth most preferred provider. Values in monetary units were 10, 10, 0, 10, 10, and 10 for, respectively, SAMU/SMUR, SOS doctors, doctors on duty, ambulance/firemen, hospital emergency units and outpatient emergency centres. Here the WTP values found 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 did not provide differentiated answers between the most preferred options).

Inconsistent answers refer to all other cases, i.e. to rankings that are neither fully consistent nor partially inconsistent for a given provider (e.g explicit ranking ranked SAMU/SMUR as the first most preferred option. Values in monetary units were 80, 60, 30, 40, 90, and 20 for, respectively, SAMU/SMUR, SOS doctors, doctors on duty, ambulance/firemen, hospital emergency units and outpatient emergency centres. Hence monetary values suggest that SAMU/SMUR is ranked second after hospital emergency units, which is inconsistent with the explicit ranking).

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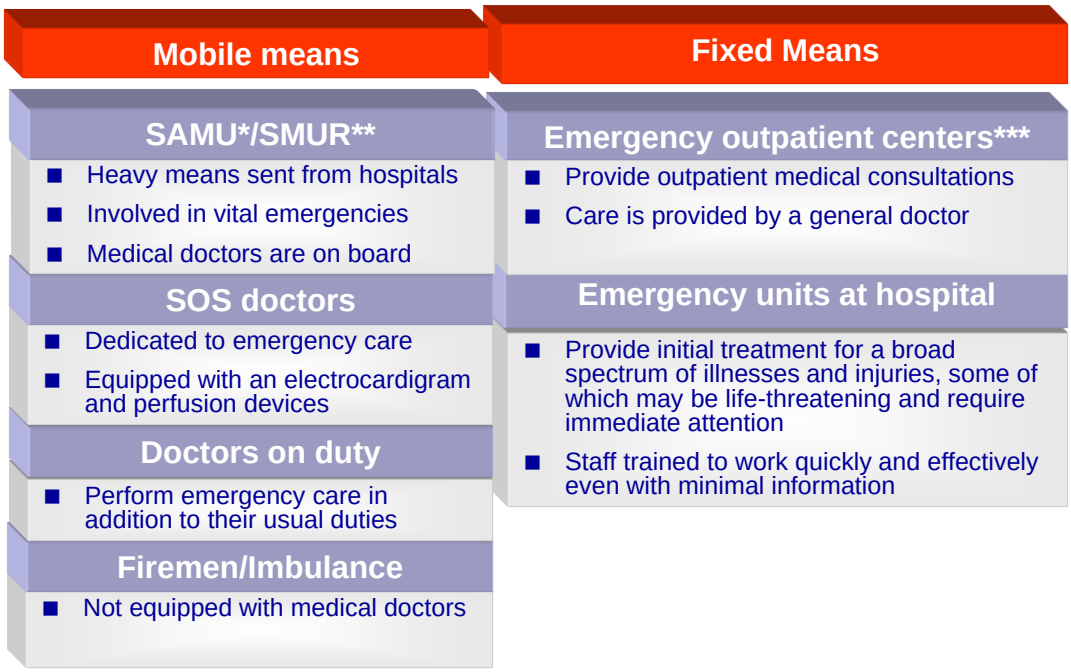
Table 1: Description of emergency providers in France



** Service d'Aide Médicale d'Urgence*
*** Services Mobiles d'Urgence et de Réanimation attachés aux hôpitaux*
**** «Maisons Médicales de Garde»*

Table 2: Descriptive statistics concerning the study population

	All n = 280	Standard questionnaire n = 140	Incremental questionnaire n = 140	p*
Age (mean)	50.1	50.9	49.4	0.46
Male (%)	45.7	39.3	52.1	0.03
Education level				0.60
Secondary school or short professional track (%)	31.4	32.1	30.7	
High school diploma (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's (%)	31.4	29.2	33.5	
Individual is married or living in a couple (%)	57.1	57.9	56.4	0.81
Number of children under 15 living in the household (mean)	0.4	0.4	0.4	0.95
Monthly household net Income (1-10)** (mean)	5.7	5.8	5.6	0.64
Health status				0.83
Excellent self assessed health (%)	30.0	30.0	30.0	
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
Used at least one of the 6 emergency services in the previous year	33.3	29.3	37.9	0.13

All statistics are weighted

* Test of difference between the standard and incremental versions
(student t-test for continuous variables, chi2 for categorical variables)

** (euros per month) 1 . < 800, 2. [800 - 1000[, 3. [1000 - 1200[, 4. [1200 - 1500[, 5. [1500 - 1800[, 6. [1800 - 2300[, 7. [2300 - 3000[, 8. [3000 - 3800[, 9. [3800 - 5300[, 10. ≥ 5300 euros

Table 3: Distribution of provider 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	
	Ambulance/ 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 centres	3.6	2.1	3.6	7.9	15.4	67.5	
Standard questionnaire	SMUR/SAMU	33.6	32.9	17.9	7.1	5.7	2.9	0.9
(n = 140)	SOS doctors	15.0	17.9	22.9	22.9	16.4	5.0	0.2
	Doctors on duty	7.9	9.3	10.7	22.9	40.0	9.3	0.2
	Ambulance/ Firemen	31.4	26.4	21.4	12.9	3.6	4.3	0.4
	Hospital emergency units	10.7	11.4	22.9	25.7	21.4	7.9	0.2
	Outpatient emergency centres	1.4	2.1	4.3	8.6	12.9	70.7	0.3
Incremental questionnaire	SMUR/SAMU	35.0	32.9	14.3	10.0	5.0	2.9	
(n = 140)	SOS doctors	8.6	15.0	21.4	25.0	18.6	11.4	
	Doctors on duty	8.6	4.3	18.6	22.9	32.9	12.9	
	Ambulance/ Firemen	28.6	25.0	24.3	9.3	9.3	3.6	
	Hospital emergency units	13.6	20.7	18.6	25.7	16.4	5.0	
	Outpatient emergency centres	5.7	2.1	2.9	7.1	17.9	64.3	

*chi2 test of differences in the distribution of respondents' answers to the ranking question between the standard and incremental questionnaires

Table 4: Mean and median WTP by provider in the standard and incremental questionnaires

		SMUR/ SAMU	SOS doctors	Doctors on duty	Ambulance/ Firemen	Hospital emergency units	Outpatient emergency centres
Standard version (n = 140)	mean	41.2	36.7	37.6	34.8	32.3	26.0
	std	46.7	41.0	42.7	41.0	38.2	34.5
	median	30.0	25.0	20.0	20.0	20.0	10.0
	% of < 5 euros answers	27.86	25	27.86	28.57	32.14	40
Incremental version (n = 140)	mean	103.2	66.1	59.5	97.9	69.2	41.9
	std	130.7	90.0	83.9	127.2	77.3	74.9
	median	57.5	30.0	27.5	47.5	42.5	10.0
	% of < 5 euros answers	19.29	25.71	26.43	19.29	19.29	35.71

Table 5: Test of comparison in WTP for each possible pair of providers

	Mean comparison test (1)		Median comparison test (2)	
	Standard questionnaire (n = 140)	Incremental questionnaire (n = 140)	Standard questionnaire (n = 140)	Incremental questionnaire (n = 140)
SMUR/SAMU versus SOS doctors	0.19	<0.01	0.90	0.04
SMUR/SAMU versus doctors on duty	0.33	<0.01	0.81	0.06
SMUR/SAMU versus ambulance/firemen	0.07	0.22	0.34	0.55
SMUR/SAMU versus hospital emergency units	<0.01	<0.01	0.19	0.09
SMUR/SAMU versus outpatient emergency centres	<0.01	<0.01	0.01	<0.01
SOS doctors versus doctors on duty	0.77	0.15	0.81	0.81
SOS doctors versus ambulance/firemen	0.52	<0.01	0.55	0.12
SOS doctors versus hospital emergency units	0.22	0.52	0.34	0.28
SOS doctors versus outpatient emergency centres	<0.01	<0.01	0.02	0.12
doctors on duty versus ambulance/firemen	0.32	<0.01	0.72	0.15
doctors on duty versus hospital emergency units	0.06	0.06	0.47	0.34
doctors on duty versus outpatient emergency centres	<0.01	0.01	0.04	0.12
imbulance/firemen versus hospital emergency units	0.42	<0.01	0.72	0.91
imbulance/firemen versus outpatient emergency centres	<0.01	<0.01	0.09	<0.01
hospital emergency units versus outpatient emergency centres	0.03	<0.01	0.18	<0.01

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

Table 6: Mean and median WTP by provider in the standard and incremental questionnaires, depending on the explicit ranking

	WTP in the standard version		WTP in the incremental version	
	Mean	n	Mean	n
SMUR/SAMU ranked 5-6*	35.8	12	24.1	11
SMUR/SAMU ranked ≤ 4th*	41.7	128	109.9	129
SOS doctors ranked 5-6*	40.2	30	32.0	42
SOS doctors ranked ≤ 4th*	35.7	110	80.7	98
Doctors on duty ranked 5-6*	36.0	69	30.9	64
Doctors on duty ranked ≤ 4th*	39.2	71	83.6	76
Ambulance/ Firemen ranked 5-6*	35.9	11	32.8	18
Ambulance/ Firemen ranked ≤ 4th*	34.7	129	107.5	122
Hospital emergency units ranked 5-6*	37.3	41	61.1	30
Hospital emergency units ranked ≤ 4th*	30.2	99	72.5	110
Outpatient emergency centres ranked 5-6*	24.5	117	26.7	115
Outpatient emergency centres ranked ≤ 4th*	33.7	23	111.8	25

* based on the explicit ranking question (see Table 3)

Table 7: Percentage of fully consistent / partially consistent / inconsistent rankings in the standard and incremental questionnaires, by provider (in comparison with explicit ranking)

	Standard questionnaire (n = 115)*			**Incremental questionnaire** (n = 116)*	
	Fully consistent	Partially consistent	Inconsistent	Fully consistent	Partially consistent
SMUR/SAMU	26%	22%	52%	88%	12%
SOS doctors	21%	22%	57%	78%	22%
Doctors on duty	13%	30%	57%	78%	22%
Ambulance/ Firemen	18%	24%	57%	80%	20%
Hospital emergency units	17%	26%	57%	78%	22%
Outpatient emergency centres	17%	43%	40%	77%	23%

*Individuals with very small (< 5 euros) WTP answers for all six options are excluded

Table 8: Estimation of an ordered probit model based on the explicit ranking of providers (1) and a Tobit model based on WTP values (2)

	Standard questionnaire		Incremental questionnaire	
	Ranking (1)	WTP (2)	Ranking (1)	WTP (2)
SAMU/SMUR	-0.768***	4.70	-1.086***	49.85***
SOS doctors	*ref*	*ref*	*ref*	*ref*
Doctors on duty	0.409***	0.51	0.188***	-9.84*
Ambulance/ Firemen	-0.666***	-5.19	-0.82***	42.56***
Hospital emergency units	0.171	-9.30	-0.329	3.99
Outpatient emergency centres	1.741***	-18.69***		-50.66***
Male	0.007	-4.74	-0.003	28.48
Age 18 - 30	-0.014	17.63	-0.006	69.9*
Age 31 - 50	-0.010	25.16	-0.013	31.36
Age 51 - 65	0.008	-1.64	-0.009	31.55
Age > 65	*ref*	*ref*	*ref*	*ref*
Excellent health status	0.001	-0.62	-0.007	47.43***
Good health status	*ref*	*ref*	*ref*	*ref*
Poor health status	0.014	-0.82	-0.02**	92.68***
Income	*-0.035*	1.78	0.001	8.33***
Number of children under 15 living in the household	0.008	-12.85	-0.004	-0.93
Individual has supplementary health insurance coverage	*0.038*	-7.65	-0.020	68.01***
Used at least one emergency service in the previous year	-0.010	-8.88*	-0.007	-43.36***
n	666	666	678	678
Test of normality of residuals (null hypothesis: normal errors)		0.72		0.82
Test of homescedasticity		0.65		0.68

(1) Ordererd probit models clustering for individuals (1 = most preferred option … 6 = least preferred option)
(2) Tobit models clustering for individuals
* significant at 0.10 level, ** significant at 0.05 level, ***significant at 0.001 level
All models include geographical areas (department) dummies
*Individuals with very small (< 5 euros) WTP answers for all six options are excluded

Table 9: Characteristics of individuals providing very small (<5 euros) WTP values for all 6 providers

	Individual with very small WTP for all six options n = 49	others n = 231	p*
Age (mean)	61.8	47.6	<0.01
Age 18 - 30	0.0	19.5	<0.01
Age 31 - 50	18.4	36.4	
Age 51 - 65	42.9	29.4	
Age > 65	38.8	14.7	
Male (%)	40.8	46.8	0.45
Secondary school or short professional track (%)	34.7	30.7	0.87
High school diploma (Baccalaureat)	22.5	21.2	
Short university studies (2 yrs) or long professional track (%)	12.2	16.5	
University degree higher than Bachelor's degree (%)	30.6	31.6	
Individual is married or living in a couple (%)	61.2	56.3	0.53
Number of children under 15 living in the household (mean)	0.2	0.5	0.13
Income (1-10) (mean)	6.0	5.7	0.48
Excellent self assessed health (%)	20.4	32.0	0.27
Good self assessed health (%)	55.1	46.3	
Poor self-assessed health (%)	24.5	21.7	
Individual has supplementary health insurance coverage (%)	98.0	89.2	0.05
Used at least one of the 6 emergency services in the previous year	22.5	35.9	0.07

* Test of difference between individuals with very small WTP for all six options and other individuals (student t-test for continuous variables, chi2 for categorical variables)

Table 10: Mean WTP by income level in the incremental approach (n = 116)

	SMUR/ SAMU	SOS doctors	Doctors on duty	Ambulance/ Firemen	Hospital emergency units	Outpatient emergency centres
net income < 1500	71.4	45.8	41.9	72.6	50.3	31.0
net income 1500 - 3000	130.5	77.8	67.8	115.0	82.5	45.8
net income > 3000	106.2	75.8	70.8	108.8	76.2	50.9

Figure 1: Reference dependent preferences in commodity space.

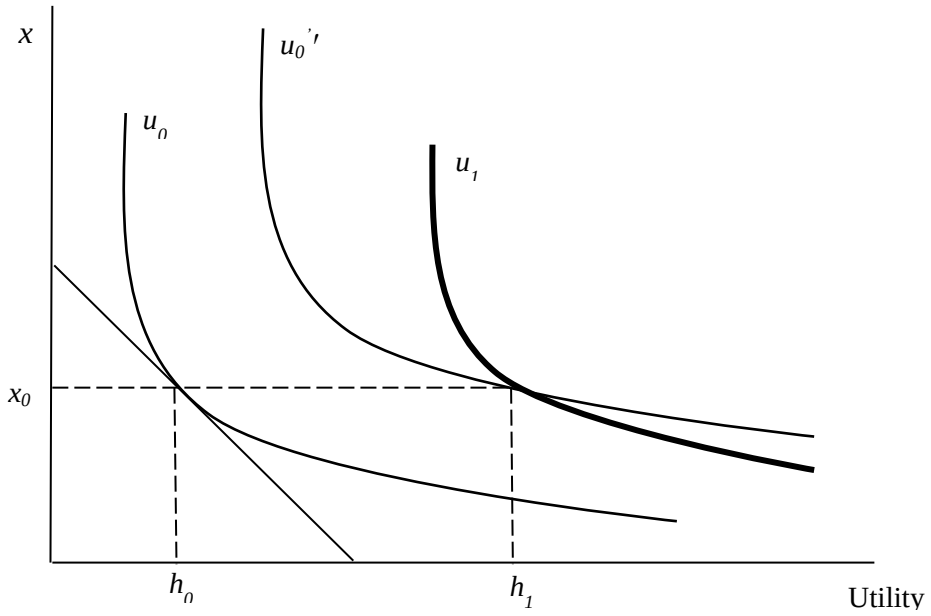


Figure 2: Standard WTP measure comparing h_1 and h_2.

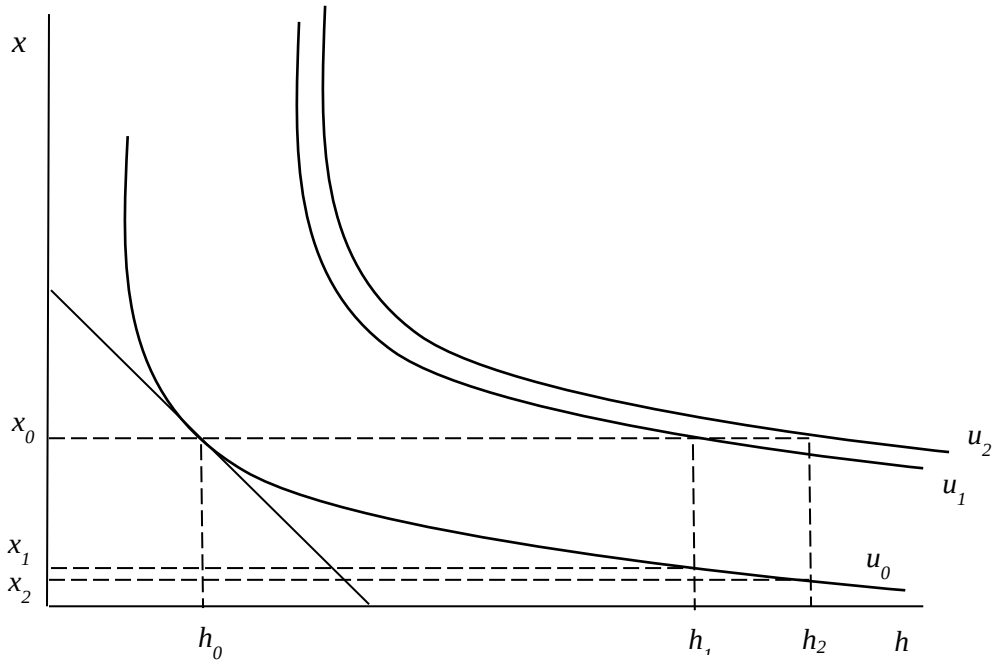
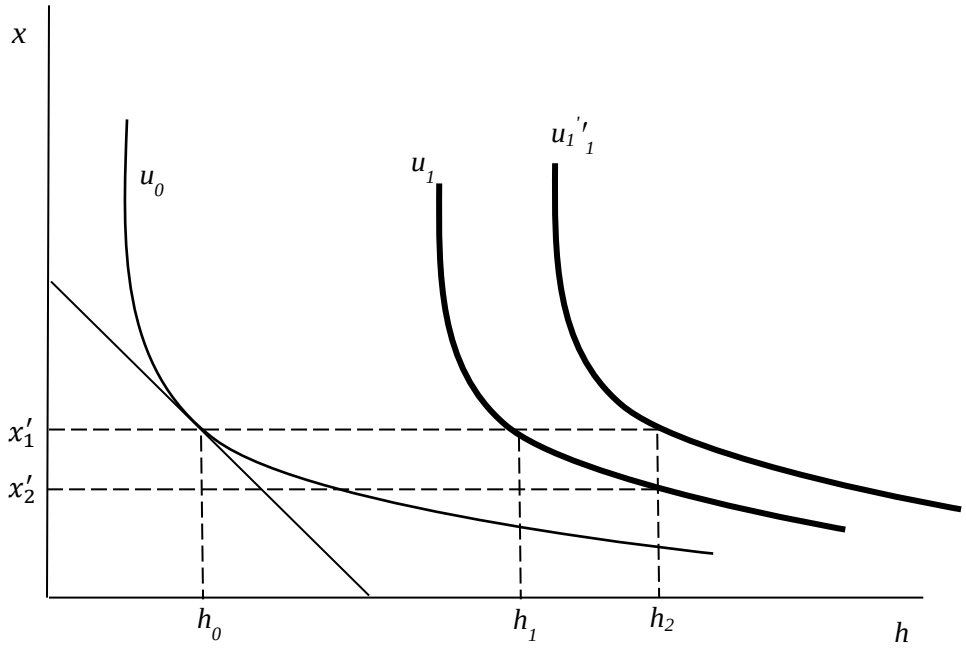


Figure 3: Incremental WTP with reference dependent preferences



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