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Homo Economicus and Homo Politicus: interpretation and aggregation of environmental values

Karine Nyborg*

Research Department, Statistics Norway, P.O. Box 8131 Dep., N-0033 Oslo, Norway

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Abstract

In addition to his role as a consumer pursuing his own interests, an individual may also regard himself as an ethical observer or citizen, judging matters from society's point of view. However, an individual's personal preferences do not necessarily coincide with his social preferences. This paper presents a formal model in which individuals are assumed to have two distinct preference orderings: *Personal well-being functions* are applied in contexts where the individual regards himself as a consumer, while *subjective social welfare functions* are used when the citizen role is perceived as most relevant. The paper discusses the implications for environmental valuation if some respondents take on a citizen role when reporting their willingness to pay.

JEL classification: D11; D61; H41; Q21

Keywords: Environmental valuation; Social welfare judgments; Multiple preference orderings

1. Introduction

In contingent valuation studies of environmental change, major fractions of respondents' reported willingness to pay sometimes appear to be motivated by altruism or moral commitment, rather than one's own use of the good (see, for example, Stevens et al., 1991). Consequently, an extensive literature on altruistic values and so-called non-use values has emerged in recent years. In most of this literature, it is assumed that individuals derive well-being from knowing that others are made better off, from the act of giving, or simply from knowing that an environmental resource exists (see, e.g., Andreoni, 1990; Arrow et al., 1993; Johansson, 1993).

* Tel.: +47-22-86-48-68; fax: +47-22-86-49-63.
E-mail address: karine.nyborg@ssb.no (K. Nyborg)

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Some authors have followed a somewhat different line of thought, however. Sagoff (1988) has argued that the literature on environmental valuation fails to distinguish between the individual's roles as *consumer* and as *citizen*: "As a *citizen*, I am concerned with the public interest, rather than my own interest; with the good of the community, rather than simply the well-being of my own family. (. . .) In my role as a *consumer*, (. . .) I pursue the goals I have as an individual." (Sagoff, 1988, p. 8). [1]

This distinction between consumers and citizens seems to suggest that every individual may have two distinct and possibly conflicting preference orderings over social states, one associated with each role. Indeed, Sagoff is not the only one to advocate such a view: several authors in other fields of economics, such as social choice theory and public choice, have suggested that individuals may have multiple preference orderings, applying different preferences in different contexts (Arrow, 1951; Harsanyi, 1955; Sen, 1977; Margolis, 1982; Hausman and McPherson, 1996). [2] Multiple preference orderings would imply that choices made in one context may not be replicated in another. For example, while my own well-being may be my main concern when shopping at the grocery store, I might still not consider my personal interests a legitimate argument when making decisions in my task as an elected politician. Consequently, values derived in one context may not be relevant in another, even if the individual perceives the valued good to be exactly equivalent in the two contexts.

To my knowledge, however, none of the above mentioned authors have formalized the implications of multiple preference orderings in the context of environmental valuation. In this paper, I propose a formalization of the distinction between consumers and citizens, or *Homo Economicus* and *Homo Politicus*, using well-known concepts from neoclassical welfare economics.

The model may provide one explanation to several of the puzzling results frequently observed in contingent valuation studies, such as large discrepancies between willingness to pay and willingness to accept, 'outliers' who report that they are willing to pay surprisingly large shares of their disposable income, and several kinds of framing effects. For such results to occur, however, some respondents must interpret the valuation question in a particular and perhaps somewhat extreme way. More importantly, however, if some or all respondents behave as citizens, it is far from clear that aggregation of willingness to pay yields a meaningful money measure of social benefits.

Below, the formal model is presented, and two distinct roles that respondents may take are pointed out: Homo Economicus, who maximizes his own well-being, and Homo Politicus, who maximizes social welfare. Further, the values reported by Homo Politicus may depend crucially on his assumptions about other individuals' payments; hence, I will distinguish between 'Homo Politicus with shared responsibility' and 'Homo Politicus with sole responsibility'. I will first discuss the pattern of responses one may expect under such a model, and then look at the issue of aggregating CVM values.

Throughout the paper, I will disregard strategic behavior; hence, it is assumed that people reply truthfully, given their interpretation of the valuation question.

[1] See also Blamey et al. (1995), Vadnjal and O'Connor (1994), Vatn and Bromley (1994).

[2] See Winston (1980) for an application to addictive behavior, and Mueller (1987) for a discussion of multiple preferences as an explanation of the voting paradox.

2. Respondents with multiple preference orderings

The main structure of the model presented below is similar to that developed in Brekke et al. (1996). First, assume that every individual is capable of making ethical judgments, and that these judgments can be represented by a subjective social welfare function, which may differ between individuals:

$$W^j = V^j(\omega_1^j, \ldots, \omega_n^j) \tag{2.1}$$

for all $j \in N$, where $N = \{1, \ldots, n\}$ is the set of all individuals in society. W^j denotes social welfare according to person j's view, and ω_i^j is individual i's well-being as judged by the observer j. Eq. (2.1) represents j's *social preferences*, which she applies whenever she perceives herself to be in the role of an ethical observer, trying to judge matters from society's point of view.[3] The social welfare functions are assumed to be transitive, continuous and increasing with respect to individual well-being.

Next, to allow for non-dictatorial social welfare functions (Arrow, 1951), we need a cardinal and interpersonally comparable measure of individual well-being. There is no commonly accepted way to measure such a well-being concept. However, in everyday life, people nevertheless make intuitive judgments about each other's well-being. Hence, I will assume that if given information on i's *income, his access to public goods, and his characteristics*, any person j is able to arrive at a subjective judgment of i's well-being:

$$\omega_i^j = v^j(x_i, y; \alpha_i) \tag{2.2}$$

for all $i, j \in N$. Here, x_i is i's net disposable income (after taxes), which is assumed to be exogenous to i, y is a physical quantity (or quality) indicator for provision of a pure public good, and α_i is a vector describing i's individual characteristics. Characteristics are assumed to be fixed and observable, not subject to individual judgment by j. In the following, the preferences described by Eq. (2.2), with $i = j$, will be called j's *personal preferences*.[4] The individual well-being functions are assumed to be continuous, concave and increasing in income and the public good. Moreover, it will be assumed that as the respondent's own income is reduced towards a subjective subsistence limit $\bar{x}^j \geq 0$, the partial derivative $\partial v^j / \partial x_j$, or j's marginal well-being of income, goes to infinity.[5]

Regarding the well-being function (2.2) as an *indirect* well-being function, corresponding to the usual concept of indirect utility functions, will prove useful below. The variables entering the underlying *direct* well-being function, then, are the public good and a vector of private goods (and, in addition, individual characteristics). The prices of the private goods

[3] A more general formulation of Eq. (2.1) would be to include an intrinsic value variable, representing non-welfaristic concerns; for instance, the view that nature has a value of its own, that animals have rights, or religious concerns. However, such inclusion does not significantly change the main results of this paper.

[4] The well-being judgement (2.2) is assumed to be cardinal and comparable between persons *from* j's *point of view:* she can judge whether she thinks Mr. A is better off than Mr. B, and whether he is much better off or just a little, but she may not be able to judge whether Mr. A, or anyone else, agrees with her view on this.

[5] The subjective subsistence limit should not necessarily be interpreted as the income required for physical survival. Another interpretation is that $\bar{x}^j$ is the income tied up by previous financial commitments, or an income level below which the respondent is never willing to take on any social responsibility.

are assumed to be fixed throughout the paper, hence the price variables may be suppressed in the indirect well-being function. It is assumed that no prices are being paid for the public good in the status quo. Introduction of a tax to finance an increase in the provision of the public good can be treated as an exogenous shift in net disposable income associated with the project.

Eqs. (2.1) and (2.2) represent two different preference orderings over social states for each individual. Although one is input to the other, they may still be conflicting in the sense that if social state A is preferred to B according to the personal preferences, B may still be preferred to A according to the social preferences.[6] I have deliberately chosen not to use the term *utility function* for the personal preferences, since this term is usually defined as a numerical representation of an individual's revealed (or stated) binary choices. Clearly, if individuals sometimes use their personal preferences, and at other times use the social preferences, their utility functions, defined as representations of revealed choices, will contain elements of both, and may be intransitive.[7]

Non-paternalistic altruism is sometimes formalized as an assumption that j's well-being (or utility) depends upon i's well-being: $\omega_j = u^j(x_j, y, \omega_i)$, where $j \neq i$.[8] For simplicity, no altruism (or envy) components are included in the well-being functions (2.2).[9] Note that although the social preferences (2.1) may look fairly similar to altruistic well-being functions, there is a conceptually important difference (Harsanyi, 1955): multiple-preference orderings allow an individual to prefer one alternative from a social point of view, but another from a personal point of view. With unique preferences, there can be no such difference, regardless of whether those preferences are altruistic or not.

A comprehensive analysis of the factors that induce individuals to take on one role or the other is outside the scope of this paper. I will simply put forward the hypothesis that *some* (presumably not all) respondents to contingent valuation (CVM) studies apply their social preferences when valuing environmental goods, and examine the implications of this hypothesis.

CVM researchers quite explicitly try to create a hypothetical market. In the marketplace, selfish behavior seems to be quite commonly accepted. This norm could possibly be rationalized by the 'invisible hand' argument: if everybody pursues his own interests, this will eventually benefit everyone. When it comes to public goods, on the other hand, the 'invisible hand' argument obviously does not hold: following only self-interest, everyone

[6] For simplicity, I will assume below that within the contexts of a given CVM survey, any individual takes either a personal or a social point of view. Alternatively, one could assume that individuals make compromises between their social and personal views instead of making discrete choices between the two. One might also assume that the probability that someone changes from a social to a personal point of view depends on the personal gain obtained from doing so. See Opaluch and Grigalunas (1991) for a discussion.

[7] Consider, for example, the following alternatives: A: Status quo, B: Taxes on gasoline are increased by 20 per cent in an effort to improve air quality, C: Gas taxes are lowered 20 per cent. As a member of Parliament, I may vote so as to reveal the preference $A \succ B$, and $B \succ C$. For my preferences to be transitive, $A \succ C$ must then also be true. However, according to my personal preferences, it is perfectly possible that $C \succ A$.

[8] This formulation may pose problems if several individuals are altruistic, since i's well-being depends on j's well-being, which depends on i's well-being, and so on. This will not be discussed further here, though.

[9] Instead of including altruism in the well-being functions, one could introduce altruistic preferences as a *third* preference ordering, which is activated when the individual regards himself as an agent for a smaller group of people, such as his family.

would want to free-ride on others' efforts. Indeed, most of us have been taught to adhere to certain norms restricting selfish behavior when faced with environmental issues: for example, you should not throw trash in the wilderness; you should not be cruel to wild animals; and so on. If people usually apply their personal preferences in the marketplace, but their social preferences when discussing environmental issues, it is not clear which perspective they would find it natural to take when faced with a market for environmental goods.

CVM studies also frequently imitate referenda. [10] This may actually add to the confusion (Blamey et al., 1995): a social perspective seems to be common among voters; in fact, if voters were motivated by purely selfish concerns, it is difficult to explain why they would vote at all (Mueller, 1987).

In the following, the value of any variables in the status quo will be denoted with a superscript 0; for example, x_i^0 is individual i's disposable income in the status quo. Variables without this superscript refer to the social state if the project is implemented.

3. Homo Economicus

Let us first take a look at *Homo Economicus*; the person who maximizes his or her own well-being subject to the individual budget constraint. If respondent j applies his personal preferences (that is, he maximizes his individual well-being), his personal willingness to pay p^j for a marginal change in the public good is

$$p^j = \frac{\partial v^j/\partial y}{\partial v^j/\partial x_j}\Delta y \tag{3.1}$$

where Δ denotes the difference in the associated variable's value in the situation when the project is implemented and in the status quo. If the project is not marginal, the Hicksian equivalent and compensating surplus measures can be used (see e.g. Johansson, 1993). Here, the *personal equivalent surplus*, PES^j, is implicitly defined by

$$v^j(x_j^0 + \mathrm{PES}^j, y^0; \alpha_j) = v^j(x_j, y; \alpha_j) = \omega_j^j$$

PES^j measures the change in status quo income required to give individual j exactly the same level of well-being as he would have had if the project was implemented. Assume that $y > y^0$. Then, PES^j measures the compensation that must be paid to j to make him willing to forego the increase in y, or his 'willingness to accept'.

Similarly, the *personal compensating surplus* PCS^j is implicitly defined by

$$v^j(x_j^0, y^0; \alpha_j) = v^j(x_j - \mathrm{PCS}^j, y; \alpha_j) = \omega_j^{j0}$$

which measures the amount the individual could pay for the project and still be just as well off after its implementation, in terms of well-being, as he was in the status quo.

[10] See, for example, the recommendations of the NOAA Panel (Arrow et al., 1993).

4. Homo Politicus

In contrast to Homo Economicus, *Homo Politicus* puts himself or herself in the role of the ethical observer, and tries to consider what is best for society. How could such considerations be expressed in monetary terms?

When $\Delta W^j = 0$, j is indifferent between the status quo and the social state with the project, from a social point of view. Consequently, the change in j's own income required to keep social welfare unchanged, assuming that the project can be regarded as marginal for every $i \in N$, is

$$-\Delta x_j = \frac{1}{\beta_j^j}\left[\sum_{i \neq j} \beta_i^j \Delta x_i + \sum_{\forall i \in N} \gamma_i^j \Delta y\right] \tag{4.1}$$

Here, $(\partial V^j/\partial \omega_i^j)(\partial v^j/\partial x_i) = \beta_i^j$ and $(\partial V^j/\partial \omega_i^j)(\partial v^j(x_i, y; \alpha_i)/\partial y) = \gamma_i^j$, denoting the welfare weights attached by j to an increase in i's income and access to the public good, respectively.

Note that this expression is much more complicated than Eq. (3.1), which describes the private valuation p^j. In fact, Eq. (4.1) involves a whole little modelling exercise: Willingness to pay from a *social* point of view is determined not only by the individual's own personal preferences, but also by his ethical or political views on issues such as equity, his subjective beliefs about everybody else's marginal well-being of income and public goods; and finally, the size of income changes of everybody else, which may be quite crucial. Contingent valuation surveys, however, are usually designed with the private valuation p^j in mind. For this purpose, information about others' income changes is irrelevant; hence, such information is frequently not provided. [11] Moreover, to determine the subjective welfare weights β_i^j and γ_i^j respondents generally need information about other people's status quo income and characteristics. If such information is not provided, it is difficult to know which assumptions respondents have employed.

To simplify the discussion below, I will assume that respondents know the status quo sufficiently well to determine their subjective welfare weights. The implications of varying the assumptions made about other's income changes will be studied by looking at two particularly simple cases: *Homo Politicus with shared responsibility*, who thinks everybody is going to pay exactly the same as himself or herself; and *Homo Politicus with sole responsibility*, who disregards altogether the possibility that others might pay. [12]

[11] For example, the guidelines provided by the NOAA Panel (Arrow et al., 1993) includes no specific recommendations concerning information about others' income changes. Note, however, that with altruistic preferences, such information may indeed be relevant.

[12] Other assumptions are of course possible; for example that everybody should pay an equal proportion of their income. However, I think the two examples analyzed here provide a sufficient illustration of the argument.

5. Homo Politicus with shared responsibility

Homo Politicus with shared responsibility is the person who interprets the valuation question as follows: "What is the maximum amount I find it socially right for everybody to pay, in order to ensure this project?"

Formally, shared responsibility will be interpreted as a requirement that $\Delta x_i = \Delta x_j = \Delta x$ for all $i, j \in N$. Thus, any individual income changes apart from this equal per person payment are disregarded. Let a^j be the willingness to pay for a marginal change in the public good of Homo Politicus with shared responsibility. Then, we get from Eq. (4.1) that

$$a^j = \frac{\gamma^j}{\beta^j}\Delta y \tag{5.1}$$

Here, $\beta^j = (1/n)\sum_{i\in N}(\partial V^j/\partial\omega_i^j)(\partial v^j/\partial x_i)$, which is the average welfare weight (according to j's ethical views) attached to individual income. Similarly, γ^j is the average welfare weight attached to individuals' access to the public good, $\gamma^j = (1/n)\sum_{i\in N}(\partial V^j/\partial\omega_i^j)(\partial v^j/\partial y)$.

In general, a^j may be smaller or larger than p^j. To illustrate the relationship between the two, let $\Delta y = 1$, and denote j's beliefs about i's personal valuation p_i^j, so that $p_i^j = (\partial v^j(x_i, y; \alpha_i)/\partial y)/(\partial v^j(x_i, y; \alpha_i)/\partial x_i)$ (implying that $p^j = p_j^j$). Then, we get that

$$a^j = \frac{\sum_{i\in N} p_i^j \beta_i^j}{\sum_{i\in N}\beta_i^j} \tag{5.2}$$

Thus, the difference between a^j and p^j depends on both the difference between j's own personal valuation and her judgment of others' valuation, and the welfare weight she attaches to every individual's marginal income change. Note that even if we require $p_i^j = p^i$, i.e. every individual's ordinal preferences are respected, a^j will generally differ from the average personal marginal valuation $(1/n)\sum p^i$:

$$\frac{1}{n}\sum_{i\in N} p^i = \frac{1}{n}\sum_{i\in N}\frac{\partial v^j(x_i, y; \alpha_i)/\partial y}{\partial v^j(x_i, y; \alpha_i)/\partial x_i} \tag{5.3}$$

While Eq. (5.3) is calculated using a sum of ratios, and thus can be estimated using only ordinal measurement of well-being, a^j is a ratio of sums (5.2), which does indeed require a cardinal well-being concept. $(1/n)\sum p^i$ and a^j coincide in the case that $\beta_i^j = \beta$ for all i; but if the weight $\partial W^j/\partial\omega_i^j$ varies between persons, or if j believes that different people have a different marginal well-being of income, they will generally differ. For p^j and a^j to be equal in general, one must have both $\beta_i^j = \beta$ and $p^j = (1/n)\sum p^i$. It is important to note that a^j does not provide a monetary measure of the individual's personal preferences. Rather, it reflects a mixture of ethical views, subjective beliefs about other people's preferences, and a particular assumption regarding the project's effects on other people's income. For non-marginal changes, compensating and equivalent surplus measures must be interpreted similarly.

6. Homo Politicus with sole responsibility

Consider the following reply from a CVM respondent: "I'm not real happy about an increase in ... outlay of money since ... things are pretty tight. But this is important ... and we do need to protect the environment as well as ... keeping things ... clean and possibly protecting those birds. Um, I would say maybe about, um, I would not like to ... spend more than an additional, say, US$ 1000 per year. I know that's not a lot, but that's about as much as I think I can afford." (Schkade and Payne, 1993).

Schkade and Payne report that this respondent belonged to a 'less privileged' socioeconomic group, which presumably means that US$ 1000 a year is a large proportion of the respondent's income. Such 'outliers' are frequently observed in CVM studies, and tend to constitute a constant proportion of the respondents, regardless of sample size (Mitchell and Carson, 1989).

Homo Politicus with sole responsibility takes a social point of view, assuming that $\Delta x_i = 0$ for all $i \neq j$. This is a fairly extreme case, especially if he is a utilitarian, as will be shown below. Few people would find it fair that one person alone should bear the burden of increased public goods provision. Thus, it seems unlikely that a respondent who gives the valuation question an economic interpretation, concerning an actual project that will have to be paid for, assumes that nobody else pays at all. Nevertheless, it is conceivable that some respondents interpret the question as a moral one, concerned with their willingness or ability to put personal interests aside in a purely hypothetical situation. Replying that "Yes, I would be prepared to spend US$ 1000 to save 2000 birds if that were the only way they could be saved" is not the same as saying "Yes, I am prepared to spend US$ 1000 to save 2000 birds, and I also think it is fair and reasonable that I alone shall pay."

It seems reasonable to believe that the more realistic, credible, and specific the presented scenario is, the less are the chances that respondents will interpret the valuation question this way. However, it turns out that the pattern of responses predicted from Homo Politicus with sole responsibility exhibits several of the puzzling anomalies frequently seen in CVM studies (and which also seem to appear more frequently if the valuation question is incredible or not very specific). Thus, it may still be interesting to take a further look at this case.

Let s^j be individual j's willingness to pay for a marginal change in the public good when he or she takes on the role of Homo Politicus with sole responsibility. Then, if the project can be regarded as marginal for every individual, s^j is given by

$$s^j = \frac{\sum_{i \in N} \gamma_i^j}{\beta_j^j} \Delta y \tag{6.1}$$

for every $i, j \in N$.

Recalling that $p^j = \gamma_j^j / \beta_j^j \Delta y$, one can see from Eq. (6.1) that $s^j = p^j + (\sum_{i \neq j} \gamma_i^j)/\beta_j^j$. Hence, as long as $\gamma_i^j > 0$ for some $i \neq j$, $s^j > p^j$.

s^j is also generally larger than a^j. From Eq. (5.1), we know that

$$a^j = \left[\sum_i \gamma_i^j / \sum_i \beta_i^j \right] \Delta y.$$

It follows that as long as $\beta_i^j \geq 0$ for all $i \in N$, $\gamma_i^j \geq 0$ for all $i \in N$ and $\gamma_i^j > 0$ for some $i \in N$, and $\beta_i^j > 0$ for some $i \neq j$, then $s^j > a^j$.

In the study by Schkade and Payne (1993), as much as 41 per cent of the respondents mentioned the idea that, if everyone did their part, each household would not have to give all that much.[13] These respondents gave substantially lower valuations than the others; US$ 33 as opposed to the overall average of US$ 99. It seems reasonable to assume that these respondents have adopted a point of view resembling that of Homo Politicus with shared responsibility. Among the remaining respondents, some presumably applied their personal preferences, while some may have taken a sole responsibility social point of view. The sole responsibility respondents would be expected to report high values, which would contribute to a higher average for the group not mentioning cost sharing. To check this reasoning, however, it would be interesting to know more about the pattern of responses in the group not mentioning cost sharing, in particular whether respondents talking about their own social responsibility reported substantially higher values than others.

Actually, s^j is may be of quite another magnitude than p^j: for example, for a utilitarian respondent who believes that everybody else is equal to herself and has the same status quo income, s^j is n times the marginal personal willingness to pay! Thus, even if her personal marginal rate of substitution is very small (but positive), and Δy is very small as well, her social valuation still becomes very large when n is large.[14]

This brings into question the initial assumption that the project is marginal with respect to j's own well-being: actually, the social marginal willingness to pay s^j must be expected to decrease rapidly as Δy moves marginally away from zero, simply because the individual's marginal utility β_j^j of income increases, going to infinity as income comes close to the individual's (subjective) subsistence limit. Thus, we need to use discrete welfare measures.

Individual j's sole responsibility *social equivalent surplus*, SES^j, can be defined implicitly as follows:

$$V^j(v^j(x_1^0, y^0; \alpha_1), \ldots, v^j(x_j^0 + \mathrm{SES}^j, y^0, \alpha_j), \ldots, v^j(x_n^0, y^0; \alpha_n)) = V^j(v^j(x_1^0, y; \alpha_1), \ldots, v^j(x_j, y; \alpha_j), \ldots, v^j(x_n^0, y; \alpha_n)) = W^j$$

assuming that $\Delta x_i = 0$ (i.e. $x_i = x_i^0$) for every $i \neq j$. SES^j is the amount of money which must be given to j to make her think that social welfare without the project is just as large as it would have been if the project was implemented (or, her social willingness to accept).

Similarly, the *social compensating surplus* SCS^j is the amount of money which can be taken away from the respondent if the project is implemented, provided that she judges social welfare after the implementation as just as good as it was before (or her social willingness to pay).[15]

In Fig. 1, the social and private compensating surplus of a utilitarian respondent, who believes that everybody else is equal to herself and has the same status quo income, are

[13] Similar statements were reported by Clark and Burgess (1996).

[14] If, for example, one considered the 4.3 million inhabitants of Norway as the relevant population, a personal WTP of 0.1 cent per year for Δy would imply a social willingness to pay of US$ 4300 per year.

[15] SCS^j can be defined implicitly as $V^j(v^j(x_1^0, y^0; \alpha_1), \ldots, v^j(x_n^0, y^0; \alpha_n)) = V^j(v^j(x_1^0, y; \alpha_1), \ldots, v^j(x_j - \mathrm{SCS}^j, y, \alpha_j), \ldots, v^j(x_n^0, y; \alpha_n)) = W^{j0}$.

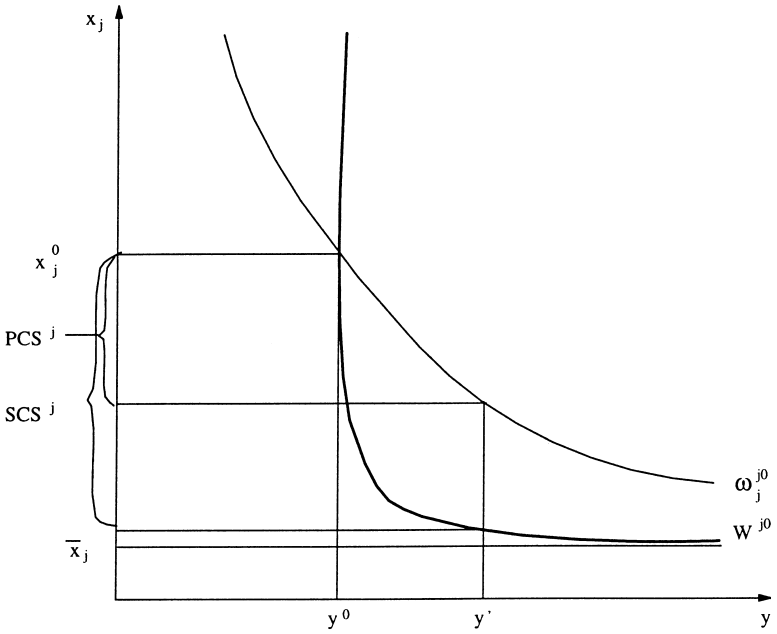

Fig. 1. Social and personal indifference curves and compensating surpluses for a utilitarian respondent with sole responsibility.

compared graphically. Assume that Δy is positive. If n is large enough, social indifference curves (that is, indifference curves according to Eq. (2.1) for this person become approximately vertical in the status quo. However, as Δy increases marginally, j's income is rapidly reduced, due to her large social marginal willingness to pay. This leads to an increase in her marginal well-being of income. Being a utilitarian, j is not concerned about a fair income distribution; thus, she thinks she ought to sacrifice her own income for the common good, as long as the well-being gained for others outweigh her own sacrifice. [16] At some stage, however, her income is reduced enough to approach her subjective subsistence level, and the marginal well-being of income goes to infinity. [17]

This yields social indifference curves like W^{j0} in the figure: In the status quo, it is much steeper than the personal indifference curve ω_j^{j0}, but personal consumption falls so fast that the social indifference curve quickly becomes almost horizontal. Intuitively, your own well-being will not count much when you let the interests of everybody else count just as much as your own; unless, that is, your situation is extremely bad. Thus, respondents taking a social sole responsibility point of view are likely to report environmental values

[16] Due to the concavity of the well-being functions, she would have considered a situation where costs were shared equally as socially better.

[17] Note that $\bar{x}^j$ need not be the income needed for physical survival, see Footnote 5. The marginal well-being of y (for all i) is implicitly assumed to be constant in the reasoning above, since Δy may still be marginal; changes in the marginal well-being of y would reinforce the argument, due to the concavity of the well-being functions.

amounting to large fractions of their disposable income. It does not necessarily matter if the valued good appears to be of little personal relevance to the respondent herself.

A utilitarian social welfare function is often regarded as a standard case, for example in cost–benefit analysis. Here, however, the utilitarian is the extreme case; the respondent herself happens to be the victim of her utilitarian willingness to sacrifice the interests of one person for the common good. A person who is more concerned about fairness or equality would not be willing to pay as much as the utilitarian, since the welfare weight $\partial V^j/\partial \omega_j^j$ would increase as her payment became large.[18] It is therefore possible that even respondents who report more 'plausible' values have taken a social sole responsibility point of view.[19]

7. Sole responsibility and CVM anomalies

The pattern of responses from Homo Politicus with sole responsibility may be very different from the pattern one would get if he had, instead, taken on the role as Homo Economicus and reported his personal values. First, the model predicts that his willingness to accept, or required compensation (WTA), may be very different from his reported willingness to pay (WTP).[20] This can be seen in Fig. 2. Assume that $\Delta y > 0$. Then, the compensating surplus measures correspond to WTP to ensure the environmental improvement, while the equivalent surplus measures correspond to the compensation required to accept that the improvement will not be realized (WTA). Assume, for simplicity, a utilitarian respondent, who believes that $\alpha_i = \alpha_j$ and $x_i^0 = x_j^0$ for all $i, j \in N$. The respondent's WTP for the move from y^0 to y', defined by her personal and social compensating surplus measures (PCS^j and SCS^j), are drawn exactly like in Fig. 1. Her personal and social WTA equal, respectively, her personal equivalent surplus PES^j and her social equivalent surplus SES^j.

The ways the personal indifference curves are drawn here, the personal willingness to accept, PES^j, is larger than the personal willingness to pay PCS^j, but of a fairly similar magnitude. However, when we look at the social preferences, this does not hold: while the social willingness to pay SCS^j is larger than the personal willingness to pay PCS^j, the social willingness to accept, SES^j, is not only larger than PES^j; but actually infinite, or, at least, extremely large. Hanemann (1991) demonstrated that the difference between WTP and WTA is related not only to income effects, but also to the degree of substitution possibilities between the public good and other goods. Intuitively, if the respondent takes a social point of view, it seems reasonable that one's own private consumption is a very poor substitute for a public good which provides benefits for everybody.

[18] As above, I assume here that the individual believes that everybody else is equal to herself and has the same status quo income.

[19] A similar reasoning would apply for a person who gives her own welfare a particularly large weight in the social welfare function (which is difficult to defend as a moral philosophy, but may reflect, for example, a lack of ability to fully distinguish the social and personal agency roles). In the limit, this corresponds to the standard case of self-interested individuals with no distinction between personal and social preferences.

[20] Large discrepancies between respondents' WTP and WTA are common in CVM surveys (see, for example, Knetsch, 1990; Arrow et al., 1993).

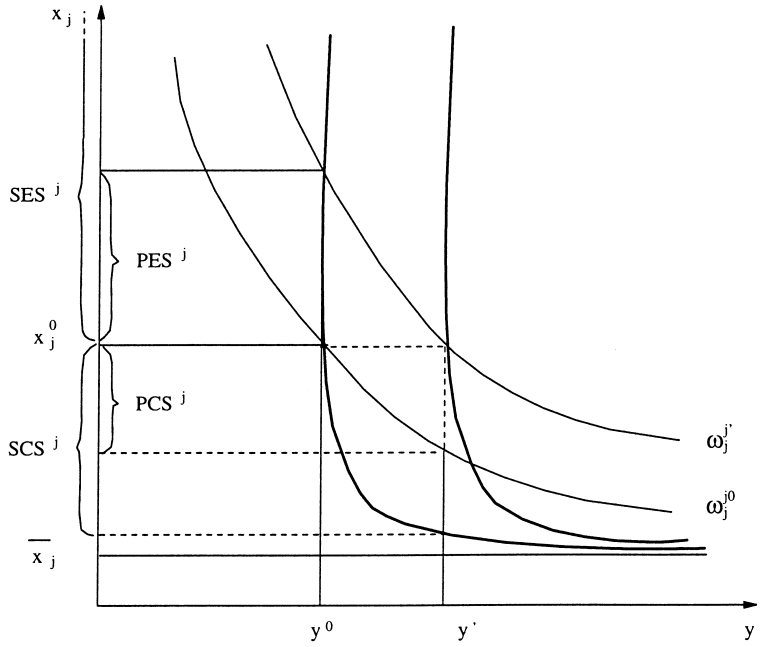

Fig. 2. Social and personal equivalent and compensating surpluses for a utilitarian respondent with sole responsibility.

Secondly, Homo Politicus with sole responsibility may report values that vary little with scope and/or scale: to the right of the kink in the social indifference curves, the curves are nearly horizontal. At this point, the respondent has already stretched himself financially as far as he believes he can, and further increases in the public good will not change his willingness to pay much. [21]

A very similar effect arises if there are *two* public goods, y and Y, and the respondent believes that the provision of both these public goods is socially sub-optimal. Assume that he is asked to report his willingness to pay for a project which improves y, but has no effects on Y. Although he thinks that increasing y would improve social welfare, it is possible that spending the same amount to increase Y instead would have improved social welfare even more. Then, if supporting an increase of Y were an available option, he would rather spend his money on that; or he may have chosen to share his contribution between the two. For our sole responsibility utilitarian respondent, it is likely that her social indifference curves for both public goods, when each of them is regarded partially, are almost vertical. However, as we have seen, social marginal WTP must be expected to decrease rapidly as income moves

[21] Some studies (Desvouges et al., 1993; Kahneman and Knetsch, 1992) have reported little sensitivity of CVM values to scale and/or scope. Other researchers have criticized these studies, and concluded that CVM values are indeed sensitive to scope; see Hanemann (1994). The two former studies were apparently conducted using a less rigorous interview technique than most recent CVM studies. This may have induced more respondents than usual to take a sole responsibility social point of view.

towards the subjective subsistence level. This means that the number of valuation questions asked, and the order in which they are asked, may affect reported WTP for each project significantly. [22]

These results are fairly similar to those expected under the 'warm glow' hypothesis, which suggests that people report their willingness to pay for the private good 'moral satisfaction' rather than for specific environmental goods. [23] However, in contrast to individuals behaving in accordance with the 'warm glow' hypothesis, Homo Politicus does not derive well-being from the act of giving.

8. Framing and roles

Within the framework presented here, one would expect responses to be sensitive to the context in which valuation questions are posed, and how they are formulated. A questionnaire focusing on the individual's moral responsibility as a social agent may induce more respondents to take the social point of view; while the choice of payment vehicle may give clues to whether others are supposed to pay or not.

It is well-known that responses in CVM studies depend crucially upon the exact wording of the questionnaire (Mitchell and Carson, 1989). This is frequently explained by the fact that a different questionnaire may give respondents a different perception of the exact good to be valued. When unique (but possibly altruistic) preference orderings are assumed, however, invoking social responsibility should not matter *per se*, as long as the description of the good is sufficiently precise: assuming that individuals are altruistic does not explain why they need to be *reminded* of their altruism to take it into account. With dual preference orderings, however, focusing on respondents' social responsibilities may induce them to change roles, thus applying social rather than personal preferences. Experimental work by Boyce et al. (1992), Peterson et al. (1995) and Ajzen et al. (1996) indicate that invoking moral responsibility does indeed increase individuals' willingness to pay.

Respondents will presumably easily take a 'consumer' point of view when asked to value a market good, such as strawberries or coffee mugs. It seems much more natural to regard the context as a political one, thus taking a 'citizen' point of view, when confronted with issues only remotely related to personal interests but closely related to ethically difficult issues, such as biodiversity or wilderness protection. If this holds, one would expect to see more outliers, larger WTP–WTA differences, larger impacts of the question sequence, and less responsiveness to scale/scope in a study concerning, for example, global warming or preservation of a species, than in, say, a study of local traffic noise. A systematic empirical investigation of this remains to be done, however.

[22] "I struggled with the money business. Not so much as to how much I was prepared to spend, because it is not a particular worry. But, if I thought I was committing myself to a pound a week towards Pevensey Levels, and then somebody else came on the door and said "What do you think of children who can't have a present at Christmas?", I think I'd probably rather give them a pound. And, it's like you've spent all your money giving it to all these people so I was coming to the view that I needed to contribute nationally and then have somebody to decide, to even it all out for me. I couldn't make that commitment." (Respondent cited in Clark and Burgess, 1996).

[23] See Andreoni (1990), Kahneman and Knetsch (1992).

In recent CVM literature, it is usually recommended to use the referendum format for the valuation question.[24] Arrow et al. (1993) argue that this format resembles the situation in actual referenda, which consumers (at least in USA) do have some experience with. If it is common to take a social point of view when voting, however, one would expect a referendum frame to induce some respondents to apply their social welfare functions. Moreover, in this case it would be natural to assume that others are also going to pay, though increased taxes. This would imply less 'anomalies' than a sole responsibility framing, but reported values may still not reflect personal well-being.

Some authors (e.g., Freeman, 1993) argue that the referendum format is familiar to respondents because it resembles the situation when deciding whether or not to buy items in the marketplace. This analogy, however, may induce respondents to take, instead, a personal point of view. Thus, although the referendum format may make respondents' situation more familiar than open-ended questions, the role ambiguity remains.

9. WTP as input into a social welfare function

The aim of a CVM study is usually to measure the social benefits of changing the public good supply. This benefit measure may then be incorporated into a cost–benefit analysis. However, for this purpose, it is indeed important to know whether people have reported personal or social values.

To illustrate this, assume that all individuals report their marginal social values from a shared responsibility point of view, a^j. From Eq. (5.1), we know that the sum of these values is given by

$$\sum_{j\in N} a^j = \sum_{j\in N} \frac{\gamma^j}{\beta^j}\Delta y = \Delta y \sum_{j\in N} \frac{\sum_{i\in N}(\partial V^j/\partial \omega_i^j)(\partial v^j/\partial y)}{\sum_{i\in N}(\partial V^j/\partial \omega_i^j)(\partial v^j/\partial x_i)} \tag{9.1}$$

Can this be interpreted as a monetary measure of social benefits? To do so, one must first be willing to postulate a 'meta' social welfare function, obtained by aggregating individual *social welfare judgments*. Further, we need to assume that such judgments of social welfare are cardinal and interpersonally comparable, and that each person's judgment should have an equal weight in the meta social welfare function. These are obviously very unconventional assumptions, although similar assumptions are frequently made about *well-being functions*. Traditional unweighted cost-benefit analysis, for example, is based upon the utilitarian normative view that social welfare is defined by the sum of individual well-being, and that all individuals have the same marginal well-being of income. Interpreting $\sum a^j$ as a monetary measure of social benefits would, rather, correspond to a moral philosophy in which social benefit is defined by citizens' judgments of projects' overall effects, giving very little emphasis to individuals' accounts of effects on *their own* well-being. It would undoubtedly be possible to develop a coherent philosophical framework for this; but one

[24] This means that respondents should be asked a *yes/no*-question like "Would you be willing to pay x to ensure y?" rather than open-ended questions like "What is the maximum amount you would be willing to pay to ensure y?"

would require quite another theoretical foundation than the one provided by the theory of cost-benefit analysis.

To be able to interpret aggregate WTP, however, the researcher must know whether respondents reported their social or personal values. The problem is really one of adding apples and oranges: Personal values, and shared and sole responsibility social values, are conceptually different, and adding them up does not make much sense. If, for example, some respondents report their sole responsibility social values, while others report their personal values, one gets a 'double-counting' of the interests of those who report their private valuations. This is quite similar to the case of unique, but altruistic preferences (Milgrom, 1993; Johansson, 1993), but the interpretation is different: in the present model, all respondents are assumed to have both social and personal preferences. The reason why two respondents report different kinds of values is not necessarily that they have different preferences, such as being more or less altruistic, but rather that they interpreted the context of the survey differently.

Hence, if individuals' preferences are as modelled here, the researcher needs to make sure that respondents take the *same* point of view. By framing the questionnaire carefully, asking explicitly for personal or social values, and including follow-up questions concerned with respondents' motives, much of the role ambiguities can presumably be removed. However, how this can be done in practice is outside the scope of this paper.

Since the underlying logic of cost–benefit analysis is based on aggregating individual *well-being* effects, it seems that it is the *personal values* that are relevant for this purpose. However, eliciting personal values poses problems on its own. If people find it natural to take a social point of view when faced with certain environmental issues, respondents may find it offensive that researchers actively try to persuade them to focus on their own interests instead. It is even conceivable that widespread practice of valuation studies encouraging respondents to think 'selfishly' might contribute to a decay of social norms concerning environmental behavior.

10. Concluding remarks

If individuals do indeed hold multiple preference orderings, environmental valuation is considerably complicated. Adding personal and social values is like adding apples and oranges, and is not meaningful. To be able to interpret the reported values, it is thus essential that researchers develop methods to ensure that all respondents give the *same* kind of response. It is not obvious which type of responses one should aim for, though. Using aggregate social values as a measure of social benefits poses the fundamental question of whether it is reasonable to let people's willingness to pay for their ethical views be decisive, or indicative at all, for public policy. On the other hand, to elicit personal values, researchers may have to persuade respondents to change from a social to a personal point of view; and respondents may react negatively to this. Solving this dilemma requires further research, and is outside the scope of the present paper. However, this is partly a question about which purpose the analysis is aiming for. One interesting road for further studies is that suggested by Blamey et al. (1995), namely to elicit social values, but to use surveys as 'surrogate

referendums' with the purpose of assessing the price-sensitivity of political support for public policy proposals, rather than as input to cost-benefit analysis.

Concerning the use of environmental values in cost-benefit analysis, the most favorable case is that *all* respondents report their personal values. Even in this case, however, cost–benefit analysis cannot provide any ethically neutral evaluation of environmental changes: it is well-known that such analysis is based on the normative and controversial premises of utilitarianism, in addition to the clearly non-verifiable assumption that everybody has the same marginal well-being of income. There is simply no way to calculate a 'true', objective answer to the question of how much environmental quality there should be.

The model presented here implies predictions that differ, in some aspects, from those of competing models. Thus, one possible approach to test the model might be to ask, for example, willingness to pay-questions to several subsamples; varying both the framing (degree of market-orientation versus political/ethical context orientation) and the information given on others' payments. The classical, non-altruistic Homo Economicus model would then predict that neither framing nor information on others' payments matters for individuals' willingness to pay for changes in the public good. The model of individuals as having unique, but altruistic utility functions would predict that others' payments matter, but not the framing. [25] The present model predicts that the framing matters, and that information on others' payments is important for the subsamples presented with a morally-oriented framing, but less so for respondents faced with the market-based context.

However, to design such an experiment in practice, one needs a reasonably good understanding of the factors inducing individuals to change between the Homo Economicus and Homo Politicus roles. This is an important issue which has not been discussed extensively in this paper, and which must be left for further research. In most situations, social norms and traditions presumably suggest one role or the other, and my unqualified guess would be that many of these norms are closely related to whether the situation has to do with the individual's behavior in markets or not. Some situations, however, such as contingent valuation studies, bears resemblance both to market and non-market contexts, and if there are no traditions or norms to rely on, doubt may arise concerning which role to take. In these instances, individuals may look for clues indicating which role is appropriate; and framing thus becomes important. If these speculations are correct, one would expect that market-based indirect valuation methods, such as hedonic pricing or the travel cost method, mainly indicate private values. On the other hand, values elicited in contingent valuation surveys may be of a much more mixed nature. In particular, non-use values, having merely nothing to do with market behavior at all, is presumably a category in which the Homo Politicus is particularly likely to play a role.

Further, the problem of not knowing which role respondents have taken might possibly be reduced somewhat by designing questionnaires such that all contextual 'clues' embedded in the survey, such as payment vehicle, problem description and suggested solution to the problem, point consistently to either a market or non-market decision-making context. Nev-

[25] Regarding Andreoni's (Andreoni, 1990) impure altruism model, however, it is conceivable that a change in framing changes the consumer's perception of his contribution as a *gift* (providing the private good of a 'warm glow') versus a *payment* (providing no such private good). If so, this might induce a framing effect.

ertheless, these more practical suggestions should be regarded as preliminary hypotheses, as further research is clearly needed to falsify or verify them.

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