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Karine Nyborg

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The Political Man and Contingent Valuation: Motives Do Count

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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, judging matters from society's point of view. It is not clear which of these possibly conflicting roles respondents in contingent valuation studies take on. This leads to ambiguities in the interpretation of reported willingness to pay. I formalize this problem using a simple model of respondents' behaviour, based on the concept of subjective social welfare functions. The model may provide one explanation to several puzzling phenomena often found in contingent valuation studies; such as large discrepancies between willingness to pay and willingness to accept, frequent occurrence of "outliers" willing to pay extremely large amounts, and certain kinds of framing effects.

Keywords: Environmental valuation, social welfare judgements, non-unique preference orderings.

JEL classification: A13, D11, D61, D62, H41, Q21.

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Address: Karine Nyborg, Statistics Norway, Research Department,
P.O.Box 8131 Dep., N-0033 Oslo, Norway. E-mail: nyb@ssb.no

1 Introduction

Do economists need to know *why* people value environmental goods? Several contingent valuation studies have found that major fractions of respondents' willingness to pay for environmental changes were motivated by altruism or moral commitment, rather than one's own use of the good (see, for example, Stevens et al., 1991). Some economists have questioned whether values motivated by such concerns should be included in cost-benefit analysis at all (Milgrom, 1993). However, the conclusion adopted by most authors seems to be that for the purposes of cost-benefit analysis, it does not matter which motives consumers have for their choices.

Questioning the relevance of particular motives for the purpose of social welfare judgements is frequently regarded as a kind of paternalism: According to the principle of consumer sovereignty, the individual himself is viewed as the best judge of what is best or most important to him. If he happens to derive satisfaction from the fact that others are well off, or tnat a moral principle is fulfilled, that is, from an economic perspective, regarded as no different from the satisfaction he gets from the consumption of any other good. For example, Freeman (1993, p.145), argues as follows: "Motivations do not play an important role in the empirical analysis of the demands of market goods. There is little talk of "prestige value" and "speed value" in the literature on the demand for automobiles. So why should motivations be important in the case of nonuse values?"

However, it is fairly well-known that in some cases, individual motives are indeed relevant for economic analysis. One example is the efficiency properties of the steady state in overlapping generation models, which may depend on whether bequests are simply accidential, or whether they are motivated by a concern for the next generation's welfare.

In this paper, I will argue that in the case of contingent valuation of environmental changes, respondents' motives are of central importance. If respondents' motives are not known, and the estimated values are incorporated into a cost-benefit analysis, one may implicitly be applying a social welfare function of a fairly strange kind.

The crux of the argument is that when asked to value an environmental change, some individuals may take on the role as a politician, trying to evaluate the proposed change from a social point of view, not a personal one. In doing this, they may apply *subjective social welfare functions*, not utility functions in the usual sense. This is conceptually not the same as having an altruistic utility function: The distinction between individual utility functions (even with altruistic elements) and the social welfare function is quite fundamental in welfare economics.

In section 2, I will explain why I believe that the usual assumption of utility maximizers is insufficient to describe respondents in a contingent valuation study. In section 3 through 7, a formal model is presented, and some results are derived. Two distinct roles that respondents may take are pointed out: "The economic man", who maximizes his own well-being, and "the political man", who maximizes social welfare. This distinction bears much resemblance to the distinction between individuals as "consumers" and "citizens" as discussed by Sagoff (1988). The formal set-up, however, is based upon concepts which are well-known from neoclassical welfare economics. Further, the values reported by "the political man" may depend crucially on his assumptions about other individuals' payments; hence, I distinguish between "the political man with shared responsibility" and "the political man with sole responsibility". In section 8, I discuss some implications of the model for the contingent valuation method (CVM), while section 9 elaborates on the use of aggregate

willingness to pay as a measure of social benefits. It is shown that if different respondents take on different roles, cost-benefit analysis fail to measure changes in social welfare, even if a utilitarian social welfare function is accepted by all individuals.

2 Do individuals have unique preference orderings?

Most literature on environmental valuation starts from the basic premise that each consumer have a unique and complete preference ordering over feasible social states. The consumer's utility function is usually defined as a numerical representation of this ranking. For utility maximizing consumers, then, it is relatively straightforward to arrive at theoretical monetary measures of changes in individual utility. For example, the Hicksian equivalent variation for a deterioration of environmental quality is simply the consumer's willingness to pay to avoid the deterioration, and this measure will generally rank alternative social states in accordance with the individual's utility function.

The most common definition of the term "utility" in economics is just in terms of *choice*, or revealed preference, without any reference to "happiness", "well-being" or the like[1]. However, the practice of using aggregate willingness to pay as a measure of social benefits in cost-benefit analysis must clearly rest upon the idea that utility somehow measures what is good for the individual. If every individual has one unique, complete and transitive preference ordering of social states, this idea is perhaps not so unnatural: In that case, there is no unambiguity about which of any two social states an individual (weakly) prefers Many economists thus find it quite straightforward to accept the preferred state as somehow "better" for her, even though the analyst does not know what motivated her choice.

Now, imagine, on the other hand, that each consumer possessed *two or more preference orderings*, using different ones at different times. This would complicate things considerably. Unambiguous conclusions about what the individual really prefers would then require dominance; to be unambiguously preferred, an alternative must then be preferred by all relevant preference orderings. To measure changes in individual well-being in such cases, one would presumably need to know why there were several preference orderings, what kind of interpretation each of them could be given in relation to the concept "well-being", and which one the consumer was using at the moment the data was collected.

Further, one might even have to redefine central concepts such as "Pareto optimality", since a change in the social state may be Pareto improving according to one set of individual preferences, but not according to another.

This idea may perhaps seem a bit far-fetched to some. However, the assumption that individuals might have more than one preference ordering has indeed been put forward by several economists, such as John Harsanyi (1955), Amartya Sen (1977), Margolis (1982), and Hausman and McPherson (1996). In fact, *the standard framework of welfare economics itself* provides a good reason to ask such a question, as I will argue below.

2.1 Subjective social welfare functions

Utility functions and social welfare functions are two crucial concepts in welfare economics. A utility function is usually taken to depict the consumer's own interests, while a social

[1]See Sen (1985).

welfare function aggregates all consumers' individual interests, in one way or another, into a notion of society's common interest.

Arrow (1951) demonstrated that under very general assumptions, it is not possible to aggregate individual rankings into a social ranking. By assuming a cardinal and interpersonally comparable utility concept, the impossibility is overcome; but there is presently no generally accepted way of measuring such a utility concept. Moreover, economic theory gives no firm answers to how the interests of different persons should be weighed against each other in a social welfare function.

If one acknowledges the *subjectivity* of the social welfare function, however, things become much easier. Even though we do not know how to measure cardinal and interpersonally comparable utility in an objective way, it is perfectly possible for any given person to have subjective beliefs about this. And although economic theory does not give any prescriptions about the distributional or other moral contents of a social welfare function, any observer is free to have his own opinion about what is good for society. Consequently, many authors regard the social welfare function as a concept defined by a particular person's point of view: "The planner", or an "ethical" or "impartial observer".

For this particular person, then, there must be *two* different, and possibly conflicting, preference orderings over social states; namely his or her own utility function and the social welfare function. To proceed with the assumption that every consumer has one unique preference ordering, thus, we must be able to somehow distinguish the "planner" or "ethical observer" from everybody else. However, it is hard to see how such a conceptual distinction might be drawn. For example, in a democracy, anybody could in principle be elected as President or Prime Minister, or get an education and a position as a government economist. Regarding "the ethical observer", it is difficult to defend the view that only some people are capable of making moral judgements. Thus, the distinction between utility functions and social welfare functions itself seems to suggest that *anybody* may have at least two different rankings of social states. Personal preferences, then, are used to evaluate social states according to one's own personal interests, while one's subjective social welfare function is applied in those occasions when one is, for some reason, put in the position of the "planner" or "ethical observer".

Harsanyi (1955, p. 315) discusses this as follows:

> "Social welfare is no longer regarded as an objective quantity, the same for all, by necessity. Rather, each individual is supposed to have a social welfare function of his own, expressing his individual values - in the same way as each individual has a utility function of his own, expressing his own individual taste. (...) Even if both an individual's social welfare function and his utility function in a sense express his own preferences, they must express preferences of different sorts: the former must express what this individual prefers (or, rather, would prefer) on the basis of impersonal considerations alone, and the latter must express what he actually prefers, whether on the basis of his personal interests or any other basis."[2]

In the literature on environmental valuation, a common observation is that some individuals are willing to pay positive amounts to secure implementation of policies they regard

[2]Sen (1977) critizises Harsanyi's model for being too simple, maintaining that several additional roles are both conceivable and relevant for economic analysis. I agree with this, but I think the fairly simple model outlined below suffices to illustrate my general point.

as morally right, even if they seem to have no personal advantages of those policies. This has frequently been interpreted as altruistic behaviour, in the sense that the individual derives personal well-being from the fact that others benefit, or that a moral principle is upheld. However, another interpretation is that some individuals react to contingent valuation studies by putting themselves in the role of a politician, or an ethical observer, trying to figure what they think is right and wrong from society's point of view. In other words, they use their subjective social welfare functions.

While it may be difficult, or even impossible, to sort out whether a given choice reveals social or personal preferences, the distinction does none the less have important implications. The intuitive appeal of the Samuelson-Bergson concept of social welfare functions rests upon the premise that some way or another, it is individual well-being that is aggregated. One might discuss whether effects on A's well-being from knowing that B is well off should count or not. However, proposing that every individual should be put in the planner's position, using his *social welfare function*, and that these views should be aggregated in a cost-benefit analysis, is conceptually something quite different. This would, actually, imply a social welfare function with social welfare functions as its arguments.

2.2 Choosing roles: Acting as an agent for yourself or society?

A proper analysis of the factors that induce individuals to take a social rather than a personal point of view probably requires sociological or psychological knowledge, and such a task is anyway beyond the scope of this paper. I will simply put forward the hypothesis that *some of the respondents to CVM studies apply their subjective social welfare functions when answering the valuation question.* In the remains of this section, I will point out a few arguments why such an hypothesis may be relevant.

Although many factors may influence a person's view of his own role, it seems reasonable to assume that the context he is in is important. That is, does the situation he is in resemble that of the "planner" or "ethical observer", or is it more natural to regard his role as that of looking after his own interests?

As an example, take an elected politician in a representative democracy. He is clearly not *supposed to* use his elected position mainly for advocating his own personal interests. If there is evidence that he has nevertheless done so, he may get a lot of trouble. However, when he goes to the grocery shop on his way home from Parliament, he chooses what to buy according to his personal tastes, without any regards to national interests; and most likely, nobody makes any fuzz if they find out. In Parliament, he is supposed to act as an agent for society, or at least for his voters; in the marketplace for private goods, self-interested behaviour is acceptable.

In other contexts, it is less clear which kind of role one is supposed to take. For example, there are no explicit rules telling voters in referenda or general elections whether they should vote in accordance with their own interests or according to what they think is best for society. Nevertheless, the view that one should take a social perspective when voting seems fairly common, implying that some people apparently vote for the option they think is best for society, even if that happens to be against their personal interests.

Now, if self-interested behaviour is accepted in the market for private goods, what about attitudes towards public goods, such as the environment? The acceptance of self-interest in the marketplace may possibly be rationalized by the "invisible hand" argument; that if everyone looks after himself, this will benefit all. When it comes to public goods, this does

not hold: Following only self-interest, everybody would want to be free-riders on others' efforts. Nobody would pay for production or preservation of public goods, although all might benefit if they agreed to do so.

However, environmental issues seem to invoke people's views of right and wrong in quite another way than issues relating to their personal consumption of private goods. I think most of us have been taught to adhere to certain norms regarding our behaviour towards the natural environment, implying that purely selfish behaviour is not encouraged. For example, you should not throw garbage in the wilderness, even if you will never return to the place, and you should not be cruel to wild animals. More generally, it is expected that you should be willing to make at least some contribution to ensure the provision of public goods.

In a CVM study, the respondent is usually asked to make an explicit trade-off between personal income and an environmental good. This is a situation which bears some resemblance to the consumer's role in the marketplace; the researcher's aim is quite explicitly to create a hypothetical market. However, the good to be valued is associated with other behavioural norms than those prevailing in the market for private goods. Moreover, the situation of a CVM respondent also resembles the role of a voter, and as noted above, some people probably take a social point of view when voting. I therefore find it reasonable to investigate the implications if some people regard themselves as "ethical observers" when reporting their willingness to pay.

It is not obvious that the agency position an individual takes depends only on the context he is in, or even that the switch from one position to another is of a discrete kind at all. In some situations, it may be possible to find some kind of compromise between one's social and personal views. It might be reasonable to assume that this is a choice which, to some extent, depends on personal pay-offs; for example, the larger personal gain one can get from changing into a personal point of view, the larger is the probability, perhaps, that one actually does so, or the larger is the probability that one makes a compromise. Opaluch and Grigalunas (1991) discuss such trade-offs in a somewhat different framework than the one used here. However, to simplify the discussion, I will assume below that within the context of a given CVM survey, any individual takes either a personal or a social point of view.

3 Modelling social and personal preferences

In the following, I will discuss environmental valuation using a simple theoretical model. The main structure of the model was developed in Brekke et al. (1994) and Nyborg (1995).

First, in accordance with the views of Harsanyi (1955) quoted above, I will assume that every individual has a social welfare function of his own. I will not follow Harsanyi, however, in his conclusion that "an individual's impersonal preferences, if they are rational, (...) must define a cardinal social welfare function equal to the arithmetical mean of the utilities of all individuals in the society" (Harsanyi, 1955, p. 316). Rather, I want to allow for a variety of ethical views. This can be formulated as follows:

$$W^j = V^j(\omega_1^j, ..., \omega_n^j) \tag{1}$$

for all $j \in N$, where $N = \{1, ..., n\}$ 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. In the following, the preferences represented by (1) will be called j's *social preferences.*[3]

A more general formulation of (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. In contingent valuation studies, respondents sometimes appear to take a moral responsibility towards animals, or even plants, not just other humans[4]. However, such inclusion does not significantly change the main results of this paper; thus, to keep the mathematics as simple as possible, no such variables are included.

Now, we need a cardinal and interpersonally comparable measure of individual well-being. Since I intend to use this model to describe respondents in a contingent valuation study, most of the "ethical observers" ($j \in N$) in this model are not experts, nor do they (presumably) have access to advanced analytical tools. However, in everyday life people nevertheless make intuitive judgements 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 judgement of i's well-being[5]:

$$\omega_i^j = v^j(x_i, y; \alpha_i) \tag{2}$$

for all $i, j \in N$, where 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 public good, which everyone has an equal access to, and α_i is a vector describing i's individual characteristics. Characteristics are assumed to be fixed and observable, not subject to individual judgement by j. y is assumed to be the only public good, and a pure public good; thus, local public goods and 'club goods' are disregarded. In the following, the preferences described by (2), with $i = j$, will be called j's *personal preferences.* Although the formulation is general enough to permit paternalistic judgements, the intended interpretation of (2) is to represent j's best attempt to understand i's personal interests, in accordance with i's own view. The model is static and deterministic.

The well-being judgement (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. Note that there is no "altruism" or "envy" component in the *well-being* functions. Such inclusion would complicate the reasoning below considerably, and would thus require a separate analysis.

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.

Regarding the well-being function (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 are assumed to be fixed throughout the paper, hence the price variables may be suppressed

[3]To ease the exposition, the respondent j will be called "she", while any other person $i \neq j$ is called "he" when regarded by j.

[4]See, for example, Spash and Hanley (1995). See also the experiment by Boyce et al. (1992) discussed in section 8.

[5]See Brekke et al. (1994).

in the indirect well-being function. Thus, (2) will be interpreted as *the maximum well-being person j thinks that person i can attain, given that i's disposible income is x_i, that he has access to the amount y of the public good, and that i's characteristics can be described by α_i.*

Any project may imply changes in individual income (for instance due to tax changes to finance the project), and in the supply of the public good. This also means, of course, that individual well-being and social welfare will depend on which projects are implemented. 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.

The social welfare functions are assumed to be continuous and increasing with respect to individual well-being. 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 $\overline{x}^j \geq 0$, the partial derivative $\partial v^j/\partial x_j$, or j's marginal well-being of income, goes to infinity.

In this model, every individual $j \in N$ has two rankings of social states: The social preferences W^j are applied when the individual regards herself as an agent for society, trying to figure what is best from society's point of view; while she uses her personal preferences ω_j^j when she acts as an agent for her own interests only. Nothing is said here about the formation of these preferences. It may, for example, well be that the determination of respondents' ethical beliefs is influenced by their personal interests. Social preferences may be changed through discourse and experience, but are assumed to be fixed within the context of a given valuation study.

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 choose in accordance with their social welfare functions and sometimes in accordance with their personal preferences, the utility functions, defined as representations of revealed choices, will contain elements of both personal and social preferences. In this case, revealed choices may be intransitive, even if both the underlying social welfare functions and well-being functions represent transitive orderings. Hence, to avoid confusion, I use the term "well-being" to describe personal preferences.

4 The economic man

Let us first take a look at the traditional *economic man*; the person who maximizes his or her own well-being subject to the individual budget constraint. Since this corresponds closely to the standard assumption in much of the literature (with the phrase "well-being" replaced by "utility"), the results in this section are well-known, but they are included for purposes of comparison.

4.1 Marginal values

To begin with, assume that the project is marginal, not only in the sense that its effects on relative prices can be disregarded, but also marginal in relation to the consumer's well-being. If respondent j applies her personal preferences (that is, she maximizes her individual

well-being), her marginal evaluation of the project can be expressed by differentiating (2), where $i = j$:

$$\Delta\omega_j^j = \frac{\partial v^j}{\partial x_j}\Delta x_j + \frac{\partial v^j}{\partial y}\Delta y \tag{3}$$

where Δ denotes the difference in the associated variable's value in the situation when the project is implemented and in the status quo. (For example, $\Delta\omega_j^j = \omega_j^j - \omega_j^{j0}$.)

When $\Delta\omega_j^j = 0$, she is indifferent between the project and the status quo. Hence, the marginal personal willingness p^j to pay for a project is found by solving (3) for $-\Delta x_j$ when $\Delta\omega_j^j = 0$. This gives

$$p^j = \frac{\partial v^j/\partial y}{\partial v^j/\partial x_j}\Delta y \tag{4}$$

Hence, an individual's personal marginal willingness to pay per unit of the exogenous public good can be interpreted as a (well-being) marginal rate of substitution, corresponding closely to the economic man's (or woman's) marginal valuation of endogenous quantity market goods.

4.2 Discrete value measures

If the project is not marginal, a linear approximation as the one used above is insufficient. However, the welfare measures most commonly used in environmental valuation, the Hicksian equivalent variation (EV) and compensating variation (CV), can be used even for non-marginal changes (see Freeman, 1993)[6].

Since the present model includes two different preference orderings per person, the variation measures must be specified in a slightly different way than the usual one. The *personal equivalent variation* will be defined in terms of the indirect well-being function (2), where $i = j$. The personal equivalent variation for a project, PEV^j, is implicitly defined by

$$v^j(x_j^0 + PEV^j, y^0; \alpha_j) = v^j(x_j, y; \alpha_j) = \omega_j^j$$

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

Similarly, the personal compensating variation PCV^j is implicitly defined by

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

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 she was in the status quo.

[6]Freeman, and also some other authors, use the term "variation" only when measuring welfare effects of price changes, while the term "surplus" is used for quantity changes.

5 The political man

Assume next that a person takes a social point of view, and applies his or her social welfare function. We may call such a person *the political man*: As the economic man, he or she is rationally maximizing an objective function subject to his budget constraint, but the objective function is different. The political man 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? Formally, the change in social welfare due to the project as perceived by j, assuming that the project can be regarded as marginal for every $i \in N$, is

$$(5) \qquad \Delta W^j = \sum_{i \in N} (\partial V^j / \partial \omega_i^j)[(\partial v^j / \partial x_i)\Delta x_i + (\partial v^j / \partial y)\Delta y] = \sum_{i \in N} (\beta_i^j \Delta x_i + \gamma_i^j \Delta y)$$

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.

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. The change in j's own income required to keep social welfare unchanged is, consequently,

$$(6) \qquad -\Delta x_j = \frac{1}{\beta_j^j}[\sum_{i \neq j} \beta_i^j \Delta x_i + \sum_{i \in N} \gamma_i^j \Delta y]$$

Note that this expression is much more complicated than (4), which describes the private valuation p^j. In fact, (6) involves a whole little modelling exercise. Willingness to pay from a *social* point of view is not only determined by the individual's own personal preferences, but also by her ethical or political views on issues such as equity. In addition, her subjective beliefs about the marginal well-being effects for everybody else when their income or the provision of public goods change is of importance.

Finally, the size of income changes of everybody else may be quite crucial. Contingent valuation surveys are frequently concerned with hypothetical projects, in which case respondents can only know the income change of other people implied by the project if this information is provided by interviewers or questionnaires. However, contingent valuation surveys are usually designed with the private valuation p^j in mind; and for this purpose, information about others' income changes is irrelevant. Hence, such information is frequently not provided; and consequently, respondents' assumptions about others' income changes may be very important to determine social willingness to pay.

Respondents to a contingent valuation study can hardly be assumed to be trained in model calculations. Moreover, anybody who is familiar with economic modelling work knows that the assumptions one employs are of vital importance for the results, both numerically and in terms of their interpretation. Thus, even if respondents were able to handle the problem as professional model analysts, there may be a whole series of ambiguities in the interpretation of reported values if it is not clear which assumptions respondents should make use of. The most important assumption in this respect is perhaps whether other people are supposed to pay, and if they are, how much.

Although respondents to CVM studies are usually not given explicit information on whether they should take a social or a personal point of view, or about how much everybody else is supposed to pay, respondents may find "clues" to these issues in the questionnaires,

or in the phrases used by the interviewer. This may give rise to framing effects of many kinds: The context in which questions are asked, and the way they are formulated, may have an important influence on reported values.

Different respondents may react to this in different ways. In sections 6 and 7, I will discuss the behaviour of respondents who take a social point of view, but who make very different assumptions about others' payments: The "shared responsibility" approach is taken by respondents who think everybody is going to pay the same amount, while respondents taking a "sole responsibility" disregard altogether the possibility that others might pay. Other assumptions regarding everybody else's payments are of course possible; for example, one may assume that everybody should pay an equal proportion of their income. However, I think the two examples analyzed below provide a sufficient illustration of the argument.

6 The political man with shared responsibility

In a study by Schkade and Payne (1993), respondents were encouraged to think about their current household income, current household expenses and other possible uses for their income. Then, they were asked the following question (with a different number of birds for different subsamples):

> "Keeping these factors in mind, what is the **most** that your household would agree to pay **each year** in higher prices for wire-net covers to prevent about 2,000 (200,000) migratory waterfowl from dying each year in waste-oil holding ponds in the Central Flyway?"

Note that there are no apparent clues in this question as to whether the respondent is supposed to regard the issue from a social or personal perspective. Here is the reply of three respondents:

> "Well, if everybody was required to pay this, I can't see why everybody could't put up at least 25 bucks a year. That would more than cover it."
>
> "You'd have to consider how many millions of people in the country would also be contributing to this...far as how much per family this would break down to and what is the cost... I mean, if it comes out to be a couple of dollars per household, then it seems reasonable.... So I'm going to say...$5."
>
> "I'd probably be willing to donate about $10 per year, and I guess if the majority of the U.S. did that, you'd uh... go a long way towards deferring the cost..." (Schkade and Payne, 1993).

Schkade and Payne report that 41 percent of their sample mentioned the idea that, if everyone did their part, each household would not have to give all that much. These respondents gave substantially lower valuations than the others; $33 as opposed to the overall average of $99.

Clark and Burgess (1996) interviewed respondents to the CVM study by Willis et al. (1995), concerning the conservation of a wet grassland area in South East England. In the Willis et al. study, people had been asked about their willingness to pay for the continuation of a policy paying farmers to manage their land in accordance with English Nature guidelines. One respondent commented his/her response to this as follows:

"I think you've got to think in terms of all our five pounds. If everybody in the area paid five pounds the farmers are going to get a lot of money." (Clark and Burgess, 1996).

Why are many respondents to CVM studies so concerned about everybody else's payment, and whether the costs will be covered or not? As demonstrated above, such considerations are irrelevant when reporting personal willingness to pay, but may be essential when a social point of view is taken. I think a reasonable interpretation of the respondents cited above is indeed that they take a social point of view, and that they are reporting something like the *maximum per person cost* they would be prepared to accept if the project were to be regarded by them as socially desirable. A judgement that the costs will be covered may then be interpreted as a belief that net social benefits are positive, provided that the costs are shared equally.

It is not clear that this is precisely the interpretation the respondents cited above had in mind; they might, for example, expect that a majority should pay, but not everybody; or that only those especially concerned with the issue would pay. As an illustration, however, let us analyze formally the role which I will call *the political man with shared responsibility:* The person who takes a social point of view, and who assumes that everybody shall pay the same amount as himself (or herself). To be precise, the question this person answers is the following: "What is the maximum amount I find it socially right for everybody to pay, in order to to ensure this project?"

6.1 Marginal values

Let a^j be the marginal willingness to pay of the political man with shared responsibility. Formally, "shared responsibility" will be interpreted as a requirement that $\Delta x_i = \Delta x_j = \Delta x$ for all $i, j \in N$. This means that any individual income changes apart from this equal per person payment are disregarded. Then, we get from (6) that

$$a^j = -\Delta x = \frac{\gamma^j}{\beta^j}\Delta y \tag{7}$$

Here, $\beta^j = \frac{1}{n}\sum_{i\in N}(\partial V^j/\partial \omega_i^j)(\partial v^j/\partial x_i)$, 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, $\gamma^j = \frac{1}{n}\sum_{i\in N}(\partial V^j/\partial \omega_i^j)(\partial v^j/\partial y)$.

If the ratio between the average weights γ^j and β^j is approximately equal to the respondent's personal marginal rate of subsitution between the public good and income, a^j will be approximately equal to the personal marginal valuation p^j. However, if j thinks that people with other characteristics (or income) than himself will value the public good differently, a^j will differ from p^j.

Generally, the interpretation of a^j is quite different from the personal marginal valuation: It does not provide a monetary measure of the individual's personal preferences, but reflects, rather, a mixture of ethical views, subjective beliefs about other people's preferences, and a particular choice of assumption regarding the project's effects on other people's income.

6.2 Discrete values

Compensating and equivalent variation measures will of course also have another interpretation for the political man with shared responsibility than they do when the economic man

is concerned. In fact, their interpretation comes very close to the concepts *uniform compensated variation* and *uniform equivalent variation* proposed by Hammond (1994). The uniform compensated variation is defined as the total amount which society is willing to pay, in the form of a uniform poll tax on all individuals, in order to be allowed to make the move from the status quo to an alternative social state. This measure must, of course, be defined according to a specific social welfare function.

The compensating variation of the political man with shared responsibility is simply $1/n$ of the uniform compensated variation, defined in accordance with this individual's subjective social welfare function. A similar reasoning applies for the equivalent variation.

It is difficult to say *a priori* whether these discrete *social* welfare measures will be smaller or larger than the corresponding *personal* welfare measures for the same individual. For the special case of a utilitarian individual ($\partial V^j/\partial \omega_i^j = \partial V^j/\partial \omega_k^j$ for all $i, k \in N$) who believes that everybody else is exactly equal to herself and has the same status quo income ($\alpha_i = \alpha_j$ and $x_i^0 = x_j^0$ for all $i \in N$), they coincide; but in the general case, this does not hold.

7 The political man with sole responsibility

Let us now consider the person who also takes a social point of view, but who makes quite another assumption about others' payments: The one who disregards altogether the possibility that someone else will pay.

This corresponds to regarding the valuation question as an (admittedly extremely) hypothetical question of the following kind: "Imagine that you were in such a position that *you alone* were able to ensure the provision of Δy. In that case, how much of your personal income would you be willing to sacrifice to achieve this?" A person understanding the valuation question in this way can be termed *the political man with sole responsibility.* He takes on the task of trading social welfare directly against his own personal income: What is most important for a good society; that I personally should have this money, or that the project is implemented? If, for example, I alone could save 2,000 birds' lives by spending \$1,000, would I not be prepared to do this?

Consider the following reply from a respondent in the Schkade and Payne (1993) study:

> "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, \$1,000 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" socio-economic group, which presumably means that \$1,000 a year is a large proportion of the respondent's income. Such "outliers" are frequently observed in CVM studies; according to Mitchell and Carson (1989), they tend to constitute a constant proportion of the respondents, regardless of sample size. As will be shown below, however, very large reported values may be expected from respondents taking a "sole responsibility" social point of view.

7.1 Marginal values

In the following, "sole responsibility" will be interpreted formally as an assumption that $\Delta x_i = 0$ for all $i \neq j$. For purposes of simplification, it will be assumed that reported willingness to pay is the only income change associated with the project. This excludes, for example, that respondents expect a tax to be imposed to finance the project, reporting only that part of their willingness to pay exceeding the expected tax.

Let s^j be the marginal willingness to pay of individual j in the role as the political man with sole responsibility. s^j is defined as the marginal change in j's income required to ensure that $\Delta W^j = 0$ when $\Delta x_i = 0$, $i \neq j$. Then, if the project can be regarded as marginal for every individual, s^j is given by

$$s^j = \frac{\sum_{i \in N} \gamma_i^j}{\beta_j^j} \Delta y \tag{8}$$

for every $i, j \in N$.

This expression indicates that s^j may be of quite another magnitude than p^j. For example, return to the utilitarian respondent who believes that everybody else is equal to herself and has the same status quo income. For such a person, the marginal willingness to pay is given by

$$s^j = \frac{\sum_i (\partial v^j(x_i, y; \alpha_i)/\partial y)}{\partial v^j(x_j, y; \alpha_j)/\partial x_i} \Delta y$$

which 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. If, for example, one considers 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 4,300 USD per year.

7.2 Discrete values

The reasoning above 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 of income increases, going to infinity as income comes close to the individual's (subjective) subsistence limit. Thus, let us define discrete measures of value as reported by "the political man with sole responsibility" formally.

The problem of defining discrete monetary measures of social welfare has been approached by Jorgenson (1990) and Hammond (1994). Their proposals are based on the *aggregate* income change required to attain a specific level of social welfare, if distributed optimally (Jorgenson) or equally (Hammond). However, the "sole responsibility" respondent is in a somewhat peculiar situation as compared to the approach of these authors, since the income she is trading against the project's effects is *her own*, not society's total income.

Generally, individual j's *social equivalent variation*, SEV^j, can be defined implicitly as follows:

$$V^j(v^j(x_1^0, y^0; \alpha_1), ..., v^j(x_j^0 + SEV^j, y^0, \alpha_j), ..., v^j(x_n^0, y^0; \alpha_n))$$

$$= V^j(v^j(x_1^0, y; \alpha_1), ..., v^j(x_j, y; \alpha_j), ..., v^j(x_n^0, y; \alpha_n)) = W^j$$

assuming that $\Delta x_i = 0$ (i.e. $x_i = x_i^0$) for every $i \neq j$.

SEV^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).

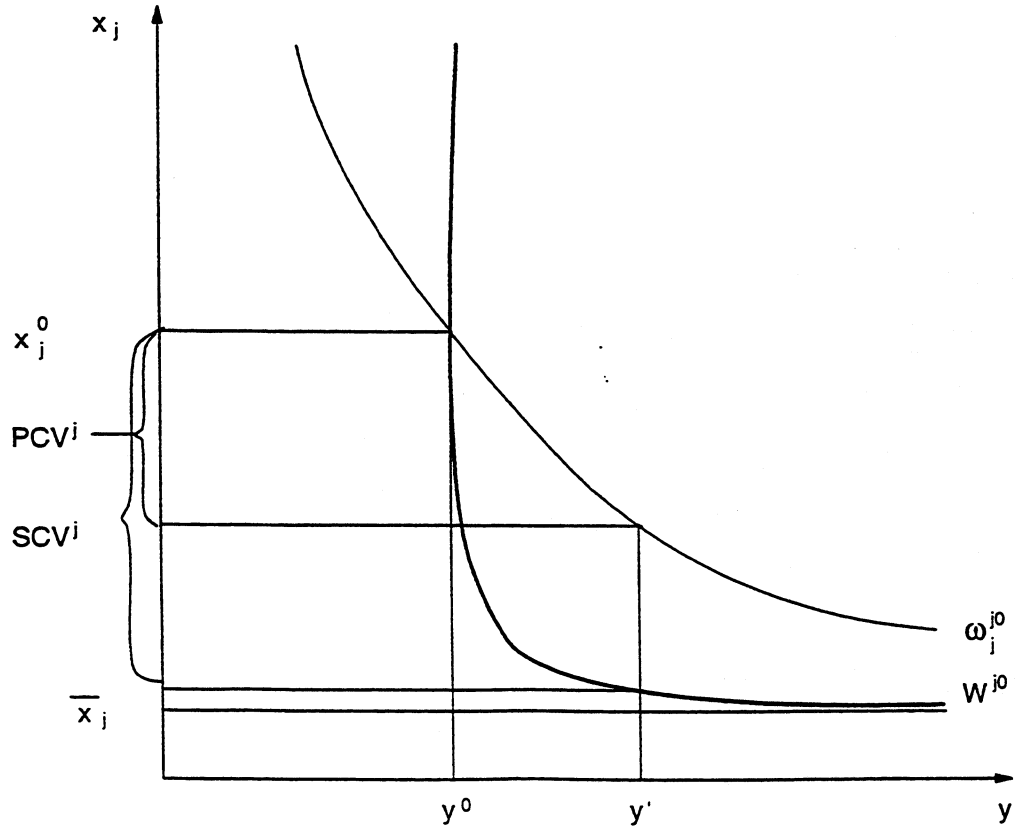
Similarly, the *social compensating variation* SCV^j is the amount of money which can be taken away from the respondent if the project is implemented, provided that she judges social welfare after the implementation as just as good as it was before (or her social willingness to pay). SCV^j can be defined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

$$V^j(v^j(x_1^0, y^0; \alpha_1), ...v^j(x_n^0, y^0; \alpha_n))$$

$$= V^j(v^j(x_1^0, y; \alpha_1), ..., v^j(x_j - SCV^j, y, \alpha_j), ..., v^j(x_n^0, y; \alpha_n)) = W^{j0}$$

The social and private discrete welfare measures can easily be compared graphically. Regard a project aimed at increasing the supply of a public good, so that Δy is positive.

Figure 1. Social and personal indifference curves and compensating variations for a utilitarian respondent with sole responsibility



Let us keep with our utilitarian respondent described above. If n is large enough, social indifference curves 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. 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.[7]

Remember that for j, everybody else's income is regarded as exogenous. Even our utilitarian friend would actually disapprove of the idea that she should pay large amounts of money while nobody else pays anything: Due to the concavity of the well-being functions, she would have considered a situation where costs were shared equally as socially better. However, she is not offered the option of distributing income in the way she regards as optimal; she interprets the valuation question as that of comparing two given alternatives, which differ only with respect to public goods supply and her own income.

This yields social indifference curves like the one drawn in figure 1. In the status quo, it is much steeper than the personal indifference curve, but personal consumption falls so fast that the social indifference curve quickly becomes almost horizontal. Intuitively, your own well-being won't 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.

Consider a change in public good supply from y^0 to y' in Figure 1. The respondent's personal compensating variation for this change is PCV^j, while her social compensating variation is SCV^j. These two concepts measure her willingness to pay to ensure the change, when she takes a personal or social point of view, respectively.[8]

Within this model, thus, respondents taking a social point of view may be likely to report environmental values amounting to large fractions of their disposable income: Since one's own well-being counts little when compared to the interest of the whole society, the utilitarian social compensating variation is likely to be restricted by the respondent's marginal well-being of income going to infinity as income moves close to the subjective subsistence level. It does not necessarily matter if the valued good appears to be of little personal relevance to the respondent herself. The subsistence level, however, is subjective, and might for example be determined by the financial obligations the respondent has previously commided herself to, rather than the income required for physical survival.

A utilitarian social welfare function is often regarded as a standard case, for example in cost-benefit analysis, although its lack of concern for equity has been duly criticized. Here, however, the respondent herself happens to be the victim of her utilitarian willingness to sacrifice the interests of one person for the common good. Hence, in the present context, the utilitarian becomes a somewhat extreme case. A person who is more concerned about fairness or equality would presumably 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. It is therefore possible that even respondents who report more "plausible" values have taken a social sole responsibility point of view.[9]

[7]The marginal well-being of public good provision (for all $i \in N$) is implicitly assumed to be constant in the reasoning above, since Δy may still be marginal. However, due to concavity of the well-being functions, changes in marginal well-being of public good provision will just reinforce the argument.

[8]The difference between SCV^j and SEV^j is discussed in section 8.2.

[9]A similar reasoning would apply for a person who gives her own welfare a particularly large weight in

Sckade and Payne's (1993) observation that respondents who mentioned the idea that everybody should pay, reported substantially lower values than the others, seems to be consistent with the model: Those mentioning the idea of cost sharing are likely to have taken a social point of view with shared responsibility. Among the remaining respondents, some have probably taken a sole responsibility social point of view, while some have applied their personal preferences. Since values reported from a shared responsibility point of view may be approximately the same magnitude as personal values, whereas sole responsibility values may be much larger, one would expect the average willingness to pay to be lower among those who mentioned cost sharing.

8 Implications for CVM studies

In this section, I will discuss some implications for the contingent valuation method of the model presented above. The most important implication is, of course, that if motives are unknown, a proper interpretation of reported values becomes impossible. However, the model may also provide one explanation to several puzzling phenomena frequently observed in CVM studies. I should emphasize at the outset, though, that I do not intend to claim that the reasoning presented below can provide extensive and entirely sufficient explanations to those phenomena.

8.1 Framing effects

Within the framework of the model presented in this paper, one would expect to see a lot of framing effects; responses may be very sensitive to the context in which the valuation questions are posed. There are two reasons for this. The first is that the specific context may induce respondents to choose a certain set of model assumptions; in particular, whether everybody should pay or not. For example, if the interviewer compares the survey with a referendum, this may induce the respondent to believe that everybody is going to pay (through increased taxes), while referring to individual charity contributions may leave more room for a sole responsibility interpretation.

Secondly, the framing of questions may induce respondents to choose one agency position (personal or social) rather than the other. A framing focusing on the individual's responsibility as a social agent might increase the possibility that the respondent applies her social rather than her personal preferences, which is likely to increase average willingness to pay.

Ajzen et al. (1996) carried out an experiment which may throw light on this. They made their respondents go through a sentence unscrambling task prior to the valuation questions, telling them that the sentence exercise and the valuation were intended as material for two entirely unrelated projects (which appears, by the way, to have been an outright lie). The sentence unscrambling task consisted of 45 sentences, containing six words each in scrambled order, and respondents were asked to pick the word that did not belong in each sentence. Some respondents received a questionnaire containing 30 sentences with a predominantly altruistic orientation, such as "Sara likes to help others", and 15 neutral sentences. Other respondents received a questionnaire with 30 individualistic statements, for example "Paul

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).

doesn't like social pressure", along with the 15 neutral statements. Their results showed that when the valued good was a public good of little personal relevance to the respondents, average willingness to pay was significantly higher for those respondents who had filled in the altruistically oriented questionnaire.

On the other hand, when the same process was used to value a private good, the orientation of the sentence test did not seem to matter. This may be an indication that respondents mainly apply their personal preferences when evaluating private market goods, but are much more easily persuaded to take a social point of view when regarding a public good. Ajzen et al. themselves conclude that when the good to be valued was of high personal relevance, their respondents paid closer attention to the arguments contained in the description of the good; while if the personal relevance was low, respondents were more easily influenced by an altruistic framing[10].

Several other studies have found similar effects. Peterson et al. (1995) conducted an experiment using the psychometric method of paired comparisons. They concluded as follows:

> "When in the role of agency for the public interest, people tend to use a different utility function than when in the role of individual consumer. When compared with shared responsibility, sole responsibility for choices among public circumstances tends to increase the relative value of public goods and services, with the effect being greatest for environmental goods. Difference in moral responsibility is a plausible explanation."

Boyce et al. (1992) conducted an experiment were people were asked to value a Norfolk Island Pine, an evergreen houseplant. Respondents were given a tree in the beginning of the experiment, and asked to bid a value for which they would be willing to sell it back to the experimenters. They were told that if their bid was below an arbitrarily chosen price (which was unknown to them), they would have to sell the tree. A subsample was told that if the tree was sold, the experimenters would destroy it. This subsample reported a substantially higher selling price ($18.43, about three times the retail price for such trees) than the reported selling price of other respondents ($8.00). This disparity may possibly be explained by some respondents taking on a "moral responsibility" for the tree.

Boyce et al. further report that the selling price for the subsample who were told that trees would be destroyed "showed a bimodality not present in the other conditions. Evidently, some people were very concerned that the trees would be killed if they sold them, while others were neither more nor less concerned about selling the trees than subjects in the no-kill conditions". They conclude that "some element of moral responsibility seems to have been captured"[11]. Note, however, that the kind of moral responsibility observed by Boyce et al. is somewhat different from the one decribed by the mathematical model of this paper: Respondents were valuing a *private* good, and the moral responsibility effect appears to be concerned with a non-consequentialist moral principle (or, possibly, the "interests of

[10]Ajzen et al. also found that if the public good was of high personal relevance, WTP was not sensitive to altruistic/individualistic framing. The public good used in this survey was a campus movie theater, and personal relevance was determined by whether respondents (who were all students) were told that it would be finished before or after they would finish studying. A campus movie theater is certainly not a pure public good, and does perhaps come closer to private market goods than many environmental issues, such as for example clean air.

[11]Some of Boyce et al.'s respondents were given a sum of money instead of a tree, see section 8.2 below. The results referred to in the present section involved only those respondents who were actually given a tree. Hence, the observed disparity cannot be explained by loss aversion.

the tree"), rather than the well-being of other humans. Such non-welfarisitic ethical views are not captured by the social welfare functions (1), but may be included in a more general model.

In recent CVM literature, one usually recommends using the "referendum" format for the valuation question. 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?". One of the arguments used for this is that such "take-it-or leave-it" questions are more familiar to respondents than open-ended valuation questions. Arrow et al. (1993), frequently referred to as providing the standard "best practice" guidelines for CVM studies, argued that this format resembles the situation in actual referenda, which consumers (at least in the U.S.) do have some experience with. If it is common to take a social point of view when voting, however, one would expect a frame resembling a referendum to induce respondents to apply their social welfare functions (with, as noted above, the assumption of equal payments being quite natural).

On the other hand, other 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. The analogy of the market place, 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.

8.2 Willingness to pay and willingness to accept

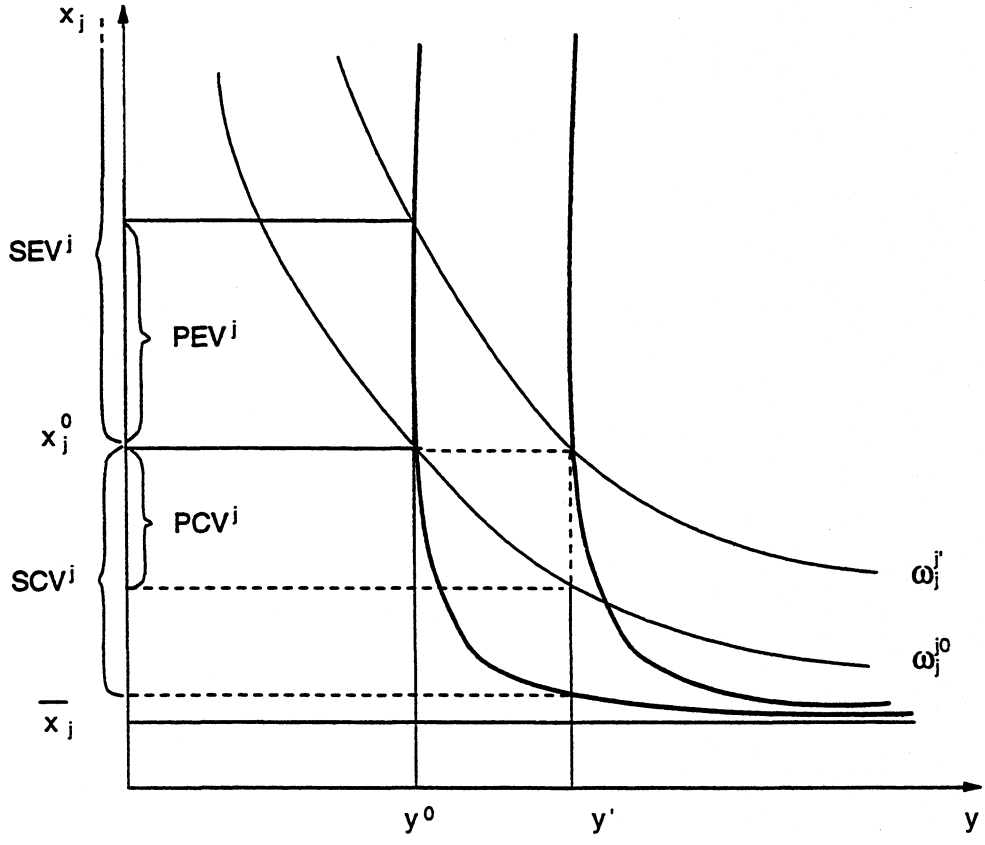
A large number of CVM studies have found surprisingly large discrepancies between respondents' willingness to pay and their willingness to accept (or compensation demanded), the latter frequently being several times larger than the former (see, for example, Knetsch, 1990). This has caused quite some discussion, since the results of Willig (1976) and Randall and Stoll (1980) indicated that these two measures would normally come quite close. However, Hanemann (1991) demonstrated that if private market goods are poor substitutes to the public good, the discrepancy may actually be infinite.

Assume that $\Delta y > 0$. Then, the compensating variation measures correspond to willingness to pay to ensure Δy (WTP), while the equivalent variation measures correspond to the compensation required to accept that Δy will not be realized (willingness to accept, or WTA).

Although several factors probably contribute to the disparity between WTP and WTA, one such factor may be that respondents take a social point of view[12]. Again, let the argument be illustrated by a utilitarian respondent, who assumes that $\alpha_i = \alpha_j$ and $x_i^0 = x_j^0$ for all $i, j \in N$. If this respondent takes a shared responsibility view, her social indifference curves will coincide with the personal ones, except that her own income on the vertical axis should really be replaced by everybody's equal income. The interesting case to look at here, however, is the case where she takes a sole responsibility point of view. Figure 2 illustrates her social and personal willingness to accept and willingness to pay, under the assumption that nobody else pays.

[12]Another factor may be loss aversion, see Kahneman and Tversky (1979).

Figure 2. Social and personal equivalent and compensating variations for a utilitarian respondent with sole responsibility



As was explained in section 7, the social indifference curve between the public good and the respondent's own income is likely to be almost vertical in the status quo point, and then become almost horizontal after a more or less sharp kink. In the utilitarian case the kink is caused by the respondent's income coming close to her subjective substistence level $\overline{x}_j$, where her marginal well-being of income goes to infinity.

The respondent's willingness to pay for the move from y^0 to y', defined by her personal and social compensating variations (PCV^j and SCV^j), are drawn exactly like in Figure 1. Her personal and social willingness to accept equals, respectively, her personal equivalent variation PEV^j and her social equivalent variation SEV^j.

The ways the personal indifference curves are drawn here, the personal willingness to accept PEV^j is larger than the personal willingness to pay PCV^j, but of a fairly similar magnitude. However, when we look at the social preferences, this is does not hold: While the social willingness ot pay SCV^j is larger than the personal willingness to pay PCV^j, the social willingness to accept, SEV^j, is not only larger than PEV^j; but actually infinite, or, at least, extremely large.

The intuitive explanation to this can be related to Hanemann's (1991) result: If the respondent takes a social point of view, it seems reasonable that one's own private consumption is indeed a very poor substitute for a public good which provides benefits for everybody.

Observations of extremely large or infinite WTAs are common in the CVM literature. Also, a frequent observation is that if the WTA format is used, a large number of respondents refuse to cooperate with the interviewer, and are not willing to reply to the valuation question. Some authors have suggested the explanation that individuals hold lexicographic preferences; they are not at all willing to trade environmental goods for money. Hanley et al. (1995), for example, interpret the responses of individuals who refuse to trade losses in environmental quality for increased income in the following way:

> "These individuals might be characterised as holding a rights-based ethic regarding environmental quality, which is at odds with the utilitarian ethic implicit in the Kaldor-Hicks Test. Persons holding a rights-based ethic will refuse such a trade-off if they believe that it is our moral duty to preserve rainforests, for example. No increase in their income would compensate them (...) for a reduction in the level of rainforest (so that their WTA is infinite). Such individuals might be willing to pay some positive amount for an increase in rainforest protection (...)."

As illustrated in figure 2, however, reporting a finite WTP, but an infinite WTA, may also be perfectly consistent with a utilitarian ethic.[13]

If respondents take a sole responsibility social point of view, WTA may easily be infinite. However, when interviewers ask for WTAs anyway, this might be considered as an attempt to "bribe" the respondent into taking a personal point of view, rather than the social one which he feels to be the morally right in the given context. Such considerations may result in respondents refusing to cooperate, or reporting what is frequently called a "protest zero", rather than reporting an infinite value.[14]

[13]Note, however, that the Hicks-Kaldor test referred to by Hanley et al. requires that everybody has an equal marginal utility of income, an assumption which is violated in the example of Figure 2 as soon as Δy moves away from zero.

[14]For a similar argument, see Opaluch and Grigalunas (1991).

If our utilitarian respondent applies her social welfare function, but regards the project as a *shared* responsibility, her reported equivalent and compensating variations will equal PEV^j and PCV^j. For this result to hold, she must interpret the WTP-question as if everybody should pay the same amount, *and* the WTA-question as if everybody should receive compensation. It is possible, however, that there is a framing effect associated with the WTA or WTP formats: *Payments* are usually impersonal, equal for everyone with the same characteristics and income; this is true, for example, for most market prices and most taxes. The word *compensation*, on the other hand, is more frequently used to discuss individual cases, such as legal compensation claims. Thus, respondents may be less prone to take a shared responsibility point of view when the willingness to accept-format is used, and this may be one additional reason for the large observed disparities between willingness to pay and willingness to accept.

The study by Boyce et al. (1992) referred to in section 8.1 above may be interesting in the present context as well (although the moral responsibility effect in their experiment, as noted earlier, appears to be connected with non-welfaristic concerns rather than other persons' well-being). Some of the respondents in this study were initially provided with a sum of money, while other respondents were provided with a somewhat smaller sum of money and a tree. Those provided with money only reported a price at which they were willing to *buy* a tree, corresponding to a WTP format, while those provided with a tree reported a value at which they would be willing to *sell* it, corresponding to willingness to accept. As mentioned above, some were told that trees would be destroyed if respondents did not keep them, while others were not. For the subsamples who were told that trees would be destroyed, the difference between mean WTA ($18.43) and mean WTP ($7.81) was as large as $10.62, while for the subsample that did not get any such information, the difference was only $3.19 ($8.00-$4.81).[15]

8.3 Embedding, warm glow, or the subsistence limit?

The study by Desvouges et al. (1993) has been much cited as an example of what is sometimes called "embedding". Desvouges et al. (using essentially the same scenario as Schkade and Payne, 1993) found that average willingness to pay to save the lives of 200,000 birds was not significantly higher than willingness to pay to save only 2,000 birds. Similar results were reported by Kahneman and Knetsch (1992), who found that willingness to pay was almost the same for a narrowly defined good (rescue equipment and personnel) as for much more inclusive categories (all disaster preparedness, or even all environmental services). Kahneman and Knetsch themselves interpreted their findings as indicating that people report their willingness to pay for "the purchase of moral satisfaction", rather than for specific environmental goods. This has frequently been called "the warm glow" hypothesis.[16]

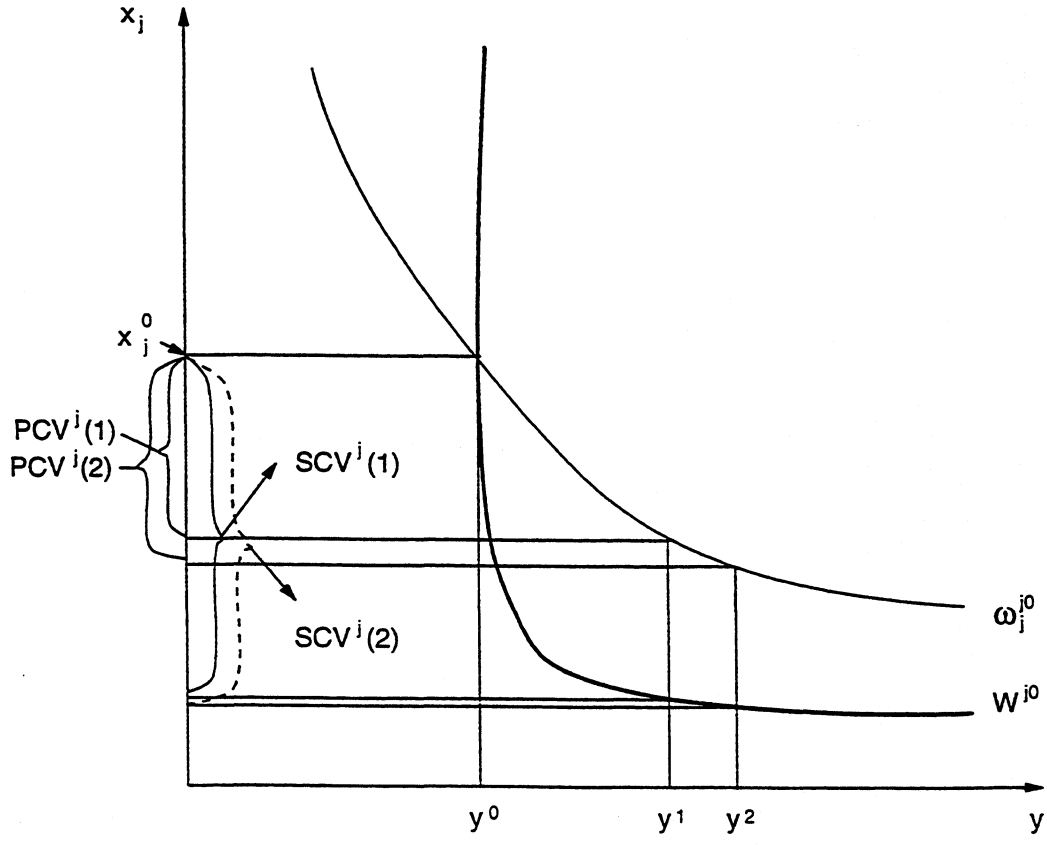
If the respondent is reporting his sole responsibility social compensating variation, willingness to pay may be bounded by the subjective subsistence limit. This means that we cannot expect the reported valuation to vary much if the valued good is changed. This is

[15]Differences between WTA and WTP has sometimes been explained by loss aversion (Kahneman and Tversky, 1979). However, the interesting result here is not the difference between WTA and WTP *per se*, but that the disparity was much larger in the case where a moral responsibility seems to have been invoked.

[16]It should also be noted, however, that these two studies have been much critizised. For example, Hanemann (1994) points out methodological deficiencies in both Kahneman and Knetsch's and Desvouges et al.'s studies, and claims that the majority finding in CVM studies is that values are indeed sensitive to scope.

illustrated in Figure 3, where two projects 1 and 2 are considered. Project 1 implies a move from y^0 to y^1, while project 2 concerns the move from y^0 to y^2. The associated personal and social compensating variations are denoted by $PCV^j(m)$ and $SCV^j(m)$ respectively, where $m = 1, 2$. If the kink in the social indifference curve is sharp enough, SCV^j will not be sensitive at all to changes in the project: As long as the respondent regards the project as socially good enough to justify his own large personal sacrifice, he will contribute until he comes close to his subjective substistence limit, and then he will contribute no more.

Figure 3. Social and personal compensating variations for projects 1 and 2, for a utilitarian respondent with sole responsibility



This yields results similar to those expected under the "warm glow" hypothesis, since the budget allocated to good causes is more or less fixed. However, the interpretation is somewhat different, since this sum cannot readily be interpreted as the respondent's valuation of the private good "warm glow of giving"; personally, he may be better off without giving anything.

Outliers are frequently omitted from the data in CVM studies; hence, a theory which only explained the behaviour of outliers might be of limited interest. Remember, however, that respondents can take a point of view somewhere in between the two polar cases of sole and shared responsibility, in which case their responses will also display a pattern lying somewhere in between. Note also that a person with sole responsibility, but with strong inequality aversion, may report values which lack sensitivity to scope, but which are not easily recognized as sole responsibility values due to their size: Willingness to pay of such persons may possibly be bounded by the welfare weights attached to one's own well-being, $\partial W^j/\partial \omega_j^j$, going to infinity, rather than the marginal well-being of income doing so.

8.4 Two public goods

This far, I have assumed that there is only one public good. Let us relax that assumption for a moment. Assume that there are two public goods, for example, y = clean air and Y = biodiversity. Assume further that the responent believes that the provision of both these public goods is socially sub-optimal. Now, she is supposed to evaluate a project which affects the provision of clean air ($\Delta y > 0$), but has no effects on biodiversity.

As long as the respondent only compares the status quo and the present project, her evaluation will be just as described in the earlier sections. However, the trouble is that according to this respondent's judgement, society is not in a social optimum. This means that although increasing y improves social welfare, it is possible that spending the same amount of money on increasing Y instead would have improved social welfare even more. Then, if supporting an increase of Y were an available option, she would rather spend his money on that; or she may have chosen to share her contribution between the two.

Let us stick with our utilitarian respondent, and assume that she still takes a sole responsibility point of view. It is quite possible 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 towards the subjective subsistence level. This means that the number of valuation questions asked, and the order in which they are asked, will affect reported WTP for each project significantly: When the second question is asked, the respondent has already stretched herself financially (hypothetically, that is) as far as she thinks she can. This effect is very similar to the one illustrated in figure 3, although we are now considering two public goods instead of two projects concerning the same public good.

The following statement in Clark and Burgess (1996) can serve as an example of a respondent who seems confused about how to handle this problem, not knowing whether to contribute to an increase in social welfare because the situation would still be suboptimal, so that other changes might have been even better:

> "I struggled with the money business. Not so much as to how much I was prepared to spend, because it's 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."

9 WTP as input into a social welfare function

The purpose of a CVM study is usually to incorporate the obtained values into a cost-benefit analysis. However, if some people are applying their personal preferences, while others take a social point of view, aggregate willingness to pay becomes very difficult to interpret. The problem is similar to that of adding apples and oranges, even though all values are reported in monetary units. Imagine, for example, that people were asked to report the price of an arbitrary item they picked up in the grocery store recently. The sum of these values would obviously not be very interesting; to get a meaningful aggregate number, you have to know what you are adding up.

Some may perhaps still object that it is up to the respondent to evaluate what is important to him; and, that if we just assume transitivity of revealed choices, reported values could be interpreted as measuring some kind of 'generalized individual welfare effects', regardless of the underlying motives. However, the very simplified example below demonstrates clearly that this could yield quite unintended results.

Assume that the purpose of the CVM study is to assess only the benefit side of a project, and that the actual funding will be accounted for in the cost calculations, which will not be discussed here. Regard a society with only two persons, I and II, who are both asked to report their marginal willingness to pay for Δy, with Δy positive but small. To make everything as simple as possible, let these two persons have the same constant marginal well-being of income λ, according to both I and II's judgement[17]. Both respondents are assumed to be utilitarian; they attach the same weight to their own well-being as to the other person's when evaluating social welfare:

$$W^j = \omega_I^j + \omega_{II}^j$$

where $j = I, II$. This brings us as close as possible to the standard assumptions underlying a cost-benefit analysis.

The social welfare function implicitly used in a cost-benefit analysis is the following:

$$\Delta W^{CB} = WTP^I + WTP^{II}$$

where WTP^i is the reported willingness to pay for person i.

Assume, now, that individual I applies his personal preferences when reporting his willingness to pay, while individual II applies her social preferences, taking a sole responsibility perspective. Aggregate willingness to pay, then, equals

$$\Delta W^{CB} = p^I + s^{II}$$

[17]This assumption requires a larger degree of interpersonal comparability of well-being than than has been necessary in the other parts of this paper.

$$= [\partial v^I(x_I, y; \alpha_I)/\partial y + \partial v^{II}(x_{II}, y; \alpha_{II})/\partial y + \partial v^{II}(x_I, y; \alpha_I)/\partial y]\frac{\Delta y}{\lambda}$$

If we assume that person II actually succeeds in judging person I's marginal well-being effect of increased public good provision in accordance with person I's own judgement, that is, $\partial v^{II}(x_I, y; \alpha_I)/\partial y = \partial v^I(x_I, y; \alpha_I)/\partial y$, we get the following result:

$$\Delta W^{CB} = p^I + s^{II} = 2p^I + p^{II}$$

That is, the measure of aggregate benefits obtained by the sum of individuals' reported willingness to pay gives individual I's personal interests a double weight. This corresponds neither to I's nor II's judgement of the change in social welfare due to the increase in y, since they are both utilitarians and think an equal weight should be attached to both. Hence, aggregate willingness to pay overstates social benefits, and systematically puts too much weight on person I's interests, as compared to the unanimous utilitarian view of the persons involved.

The problem described above arises because different kinds of value are aggregated. If one could make all respondents take the same agency position, and use the same modelling assumptions, interpretation of aggregate numbers would become possible.

Although the conceptual framework is somewhat different, this issue is very similar to the one discussed by Milgrom (1993) and Johansson (1992). Milgrom's proposed solution is to exclude what he calls "altruistic value" from the benefit calculations. In the simplified example described above, Milgrom's conclusion is supported, as exclusion of person II's concern for person I's well-being would resolve the problem.

However, several objections may be raised against this as a practical recommendation. First, even if only values motivated by personal well-being effects are included, social benefits are successfully measured only if a utilitarian ethic is accepted; as well as the hypothesis of equal marginal well-being of income. Secondly, however, if some respondents take a shared responsibility point of view, an instruction to "exclude altruistic value" may be very confusing: Remember that such respondents may report a value of similar size as the personal valuation, but which still involves others' benefits. To make willingness to pay reflect changes in personal well-being, one must generally induce respondents to take a *personal point of view*, not to exclude certain considerations.

In practice, it may be very difficult for respondents to distinguish between their personal and social motives. One is simply not used to sorting out what part of one's good feelings towards the environment can be attributed to personal interests. Moreover, the model presented in this paper is very simple in its description of factors affecting individual well-being. Although the two concepts of well-being and social welfare must be conceptually distinguished, well-being is likely to be affected by the individual's success in behaving in accordance with his ethical views (Sen, 1987). Thus, a more complicated model would probably show that some of the "altruistic" components should be included, as part of an individual well-being effect.[18]

The difficulty of distinguishing between personal and social motives could possibly be amended by educating people, making them more used to identify their personal interest of a public good, as opposed to social views. I am not convinced that this would be a wise way to proceed, though. If people actually find it natural to take on a social responsibility when

[18]However, in this case it is possible that some altruism components should be included in the cost calculations as well, see Johansson (1992), (1994).

environmental matters are concerned, that must certainly be of great importance when it comes to the prevention of 'tragedy of the common' type problems. I do not think I would like to go ahead and train people in thinking more individualistic in relation to nature.

10 Concluding remarks

Some economists have rejected the CVM method, claiming that it does not measure "true economic values" (Diamond and Hausman, 1994). Among the main arguments used are the following:

- Reported values seem to be very sensitive to the number of valuation questions asked, as well as their sequence,
- A few studies have concluded that values vary very little with the inclusiveness or scope of the valued good,
- Reported values seem to be sensitive to the framing of questions, for example whether altruistic attitudes are being activated, or whether the hypothetical payments are described as contributions, increased taxes or prices,
- Surprisingly large discrepancies between willingness to pay and willingness to accept are often observed,
- The frequent presence of outliers willing to pay huge proportions of their income, although the good to be valued may have very little personal relevance to them.

Many of these phenomena are consistent with ordinary consumer theory, but the magnitudes of the implied income and/or substitution elasticities have been questioned. However, if some respondents apply their subjective social welfare functions when responding to a CVM study, rather than their personal preferences, such observations are to be expected. The reported values of such respondents are 'true economic values' in the sense that they arise from maximization of a well-behaved objective function, but not in the sense that they measure individual well-being.

Mixing personal and social values in a cost-benefit analysis may yield quite unintended results. To be able to understand what aggregate willingness to pay really measures, one must somehow ensure that all (or at least, most) respondents interpret the valuation question in the same way, taking the same kind of agency position.

Interviewers could possibly induce respondents to report personal rather than social values by encouraging an individualistic way of thinking, specifying that effects on other individuals, and on intrinsic value variables, should only be taken into account to the extent that they affect the respondent's own personal well-being. It seems likely, however, that such instructions would be quite confusing and difficult to adhere to for many respondents. Moreover, some people may react negatively to attempts to enforce individualistic thinking about issues they feel a strong sense of social responsibility for.

What about the alternative of making all respondents report, instead, social values, and use those in a cost-benefit analysis? Several problems arise here as well. First, evaluating social welfare is a very complicated task, involving both one's own ethical judgements, an intuitive economic model, and the choice of several modelling asssumptions. The risk of substantial errors and misunderstandings thus seems large.

Secondly, there are more fundamental conceptual difficulties. Sagoff (1988), among others, has been very critical to using such procedures: Is it reasonable, and indeed compatible with democracy at all, to let people's willingness to pay for political views be decisive, or even indicative, for public policy? Shouldn't the best argument rather be chosen through deliberation and public discussion?

Cost-benefit analysis is based on the idea that it is possible to aggregate individual well-being. Aggregating social welfare functions, using some kind of 'meta' social welfare function, is an exercise which is conceptually quite different. If willingness to pay measures individual well-being, the analogy to competitive markets seems to provide a rationale for cost-benefit calcuations; but if willingness to pay reflects individuals' political or ethical views, it is not clear why simple aggregation of such money measures is a relevant procedure for arriving at collective decisions. It seems obvious that although the difference between individual well-being and social welfare may be difficult to draw, one has to keep the conceptual difference (Harsanyi, 1955, p.315); otherwise, the whole logic of welfare economics becomes rather strange.

To conclude, then: Motives do count. Perhaps they would not count all that much if the purpose of the analysis were purely descriptive; for example, like forecasting individual contributions to an environmental fund. However, cost-benefit analysis is normative analysis, and requires that the applied benefit measures can indeed be interpreted as social benefits. Regarding Freeman's (1993) observation that there is little talk of 'prestige value' and 'speed value' in the literature on the demand for automobiles, one might reply that if one is analyzing the *social benefits* of automobiles, not just demand relations, 'prestige value' and 'speed value' may indeed be relevant concepts.

Cost-benefit analysis is only one method of assessing the social desirability of a project. Moreover, it is a method which cannot be regarded as politically neutral. Frequently, however, the aim of economic analyses is to *inform* policy makers in order to make their subjective judgements well-founded, not that of actually ranking projects. In those cases, pros and contras can be envisaged in many other ways than using monetary values (Nyborg, 1995, 1996). Such information may, for example, consist of a description of the project's distributional effects, and physical indicators of environmental consequences. When looking for such alternative ways of presenting information, however, much could probably be learned from the extensive literature on how to present information to CVM respondents.

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

Tel.: + 47 - 22 86 45 00
Fax: + 47 - 22 11 12 38

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Research Department