



Estimating sign-dependent societal preferences for quality of life[☆]



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ABSTRACT

This paper is the first to apply prospect theory to societal health-related decision making. In particular, we allow for utility curvature, equity weighting, sign-dependence, and loss aversion in choices concerning quality of life of other people. We find substantial inequity aversion, both for gains and losses, which can be attributed to both diminishing marginal utility and differential weighting of better-off and worse-off. There are also clear framing effects, which violate expected utility. Moreover, we observe loss aversion, indicating that subjects give more weight to one group's loss than another group's gain of the same absolute magnitude. We also elicited some information on the effect of the age of the studied group. The amount of inequity aversion is to some extent influenced by the age of the considered patients. In particular, more inequity aversion is observed for gains of older people than gains of younger people.

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1. Introduction

Cost-effectiveness analyses are increasingly being used in health care policy in order to guide the allocation of health care resources. The concept of Quality Adjusted Life Years (QALYs) is an important tool to quantify the effects in these analyses. The major purpose of cost-effectiveness analyses is to obtain the highest health gains with a given budget. However, it is by now well-known that many individuals have a preference for the distribution of health gains alongside their magnitude (Dolan et al., 2005). In particular, people tend to give different weights to the same health improvements depending on severity (i.e., initial health status, Nord et al., 1999), age (Johannesson and Johannesson, 1997), lifetime health (Williams, 1997), and distribution among the population (Cuadras-Morató et al., 2001; Dolan and Tsuchiya, 2011; Johannesson and Gerdtham, 1996; Lindholm and Rosén, 1998). These preferences reflect a trade-off between efficiency (defined as maximizing health) and some

other factor, which is likely to include equity considerations. Equity weighting is very important for societal decisions and can have enormous ethical consequences. This highlights the need for incorporating equity weighting into health-related decision making, and to obtain proper empirical estimations of these weights.

Health-related social welfare functions (HRSWFs) have been proposed as a way to model this trade-off (Dolan, 1998; Wagstaff, 1991). A few different measurement methods have been proposed recently to elicit the HRSWF's parameters. Dolan (1998) performed a small pilot study asking students to compare two individuals at different starting health states (valued on a 0–1 scale) and assumed the power family underlying the HRSWF. He reported the Cobb–Douglas log-linear function to best represent the answers. Because of his use of different initial health states, the obtained equity weights can be viewed to relate to the severity argument (see Nord et al., 1999). Dolan and Robinson (2001) studied trade-offs between treatments that give different gains to different individuals with the same initial health status and found inequity neutrality. Johannesson and Gerdtham (1996) and Andersson and Lyttkens (1999) used a veil of ignorance approach for this purpose. Andersson and Lyttkens (1999) reported a median marginal trade-off varying from 0.11 to 0.35 years of life expectancy among the worst off in exchange for 1 year lost among the best off in society, whereas this median was 0.45 in Johannesson and Gerdtham

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(1996). Abásolo and Tsuchiya (2004, 2013) even found that people sometimes violate monotonicity in order to achieve a more equitable distribution; i.e., they sometimes prefer an outcome where all beneficiaries receive less but with a smaller difference between them.

Little research has been performed on equity weighting functions in the health domain. Bleichrodt (1997) suggested the extension of rank-dependent utility theory from decision under risk to social decision making, by giving different weights to different individuals or outcomes, in a similar fashion as assigning decision weights to probabilities in decisions under risk. Subsequently, Bleichrodt et al. (2004) pointed out that it may be unnecessarily restrictive to model aversion to health inequality solely through a concave utility function, and showed that the rank-dependent approach is consistent with the most popular HRSWFs, including those used by Dolan (1998). Bleichrodt et al. (2005) were the first to apply this rank-dependent approach empirically by implementing an adaptation of the trade-off method (Wakker and Deneffe, 1996). They elicited the equity weighting function for QALYs and reported inequity aversion, but they only considered gains. Subsequently, Turpcu (2011) extended Bleichrodt et al.'s (2005) approach to the loss domain, but did not elicit a loss aversion index. For gains, he found inequity neutrality for low proportions and inequity aversion for medium to large proportions. In the loss domain, there was inequity neutrality for all proportions.

The disadvantage of the approaches used by Bleichrodt et al. (2005) and Turpcu (2011) is that they are quite labour intensive, requiring several steps to elicit equity weights. Unlike Turpcu (2011), who used a student sample, and Bleichrodt et al. (2005) who used both a student sample and a representative sample but of a small size, we use a large sample that is representative of the general public above 18 years. This is necessary if one aims to derive policy recommendations from research. However, it is true that Internet panels also have some limitations since respondents might be different from a random sample of the general population in unobserved ways. Even in this case it seems that they should reflect societal preferences better than students. Moreover, Schwappach and Strasmann (2006) reported encouraging results regarding the reliability of Internet panels in a stated preference elicitation task to measure preferences for resource allocation in health care.

Using an approach as labour intensive as these previous studies would be prohibitively expensive when applied to a large general public sample. Therefore, we implement a simpler and shorter method. Another objective of this study is to extend the work of Bleichrodt et al. (2005) and Turpcu (2011) to include the estimation of loss aversion in this context.

Another interesting question to pursue is whether equity weighting, utility curvature, and loss aversion differ when the age of the group under consideration is varied. One reason why we might expect this is because reference points for health may vary with age. In general, health deteriorates with age, so individuals may have diminishing expectations of the (average, normal or acceptable) health level of older people than that of younger people (Brouwer and van Exel, 2005; Brouwer et al., 2005). These lower expectations may translate into lower reference points for the elderly. In turn, downwardly shifting reference points may cause health levels that are perceived as losses for young people to become gains for elderly people. Furthermore, we know from prospect theory (PT) that losses are generally treated differently than gains, with losses getting more weight than gains, and possibly different shapes of the utility functions for gains and losses and the equity weighting functions in both domains. Hence, even if individuals have the same utility and equity weighting functions for different age groups, an age-dependent reference point may result in different preferences for older people than for younger people because of a gain–loss

asymmetry. The amount of loss aversion may likewise also be age-dependent.

First, we predict a particular quality of life (QoL) level to be more likely to be regarded as a loss for young people than for old. Because of loss aversion, this would imply people attach more importance to improving health for the young than to improving health of the old, since the improvement would be a reduction of a loss for the young but an extension of a gain for the old. For example, if someone considers the reference point for an 80-year old to be 30% and for a 50-year old to be 90%, then an increase in QoL from 60% to 70% will be an extension of a gain for the 80-year old, but a reduction of a loss for the 50-year old. The 10%-point increase will then get a higher weight for the 50-year old because it is multiplied by a loss aversion parameter larger than 1. Second, if the utility and/or the equity weighting functions differ between gains and losses, a further difference in preferences for the separate age groups may emerge. For instance, individuals may be inequity seeking for a given prospect when it involves a young group, but nevertheless inequity averse for that same prospect when it involves an old group. A reason for such a difference is that people may be inequity seeking for losses and inequity averse for gains, in a similar fashion as is commonly found for monetary outcomes in a risk context (Kahneman and Tversky, 1979). There is no evidence yet to predict the effect of the utility/equity weighting difference on the differential preferences for young and old.

This research is the first to simultaneously elicit societal utility and equity weighting for both gains and losses, together with a loss aversion index in the QoL domain. In addition, our research involves another difference to previous elicitation of the HRSWF. Our experiment estimates people's societal utility function over QoL for a group of people of the same age, alongside the relative weight they give to the better-off part of this group, and does so for different groups, each of a different age. This allows us to test whether individuals have age-dependent societal preferences for health, which need not be the same as the earlier reported discrimination according to age (Johannesson and Johannesson, 1997). For instance, people may prefer to give 1 QALY to a 30-year old person than to a 70-year person because they think the younger deserves it more or is more productive (age discrimination), and, therefore, attach more weight to a QALY gained by the 30-year old person. However, at the same time, they may also have a societal utility function that is more concave for the older one, and they may consider the gained QALY an augmentation of a gain for the 70-year old, but a reduction of a loss for the 30-year old, because the reference point is generally higher for young people than for older people. The QALY gain will then get a higher weight for the 30-year old because it is multiplied by a loss aversion parameter larger than 1. In sum, we present research that is methodologically innovative and also broadens knowledge.

We find substantial inequity aversion,¹ both for gains and for losses. This can be explained by a concave utility function as well as by equity weighting of proportions. We also observe substantial loss aversion: losses for one part of the group loom larger than gains for another part. Some significant differences between different age groups are found, and the arguments provided by the subjects support the intuition attached to the parameters estimated on their responses to the allocation task.

The remainder of this paper is organized in the following way. Section 2 presents our model and introduces notation, Section 3 describes the experimental design, Section 4 gives the results and Section 5 provides a discussion and conclusion.

¹ Sometimes this behaviour is termed 'equity seeking', but we prefer 'inequity aversion' to facilitate the comparison with its counterpart for individual decision making under risk ('risk aversion').

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