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The Road Ahead for Satisfaction and Policy: Philosophical and Practical Issues

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In this paper, we review some well-known philosophical problems with the use of happiness as the maximand of social policy, as well as, the practical problems one faces if one were to take happiness seriously as a policy maker. We illustrate the mainstream solutions to these problems by means of an application to the value-of-life.

1. Introduction

How satisfaction is conceptually and empirically defined, and how it can be used to analyse economic issues has been studied quite extensively in recent times.[1] One of the ultimate objectives in this line of research is to allow for cost-benefit analyses in terms of individual self-reported satisfaction levels.

Consider a typical happiness league table (Table 1). For each country, the numbers in the table are computed by the way of social scientists aggregating individual responses to happiness or life satisfaction questions. Hence, countries are ranked based on how much the average resident enjoys her life-as-a-whole (0-10 scale). As can be seen, the values seem to tell an accurate story about living standards. Rich countries, such as Denmark, Switzerland, Australia

[1] For a review, see Clark, Frijters and Shields (2008).

and the likes of the United States, all rank in the top-third. Whereas, the truly poorer countries, such as Zimbabwe, occupy the bottom ranks.

The factors underlying these happiness differences between countries, such as income, health, culture, etc., are in principle affected by policy. Policy makers could choose to make Gross National Happiness the basis of their decisions. As yet, this does not occur on a wide scale, and the question in this paper is why not?

We take a closer look at this issue and try to review some of the philosophical and practical problems that might have prevented research on self-reported satisfaction from becoming a major tool for policy. In doing so, we separate the story into two complementing parts.[2] Section 2 lays out some philosophical hurdles that a policy maker runs into upon entering `the quality of life' arena. Should the policy maker, as a representative of the state, attach a value to the quality of life of his fellow inhabitant or should the latter use her own evaluations and opinions? To shed some light on this issue, we revert our attention to two long-standing philosophical views; Nozick's pleasure machine and Sen's contented slave theory. Both of these are philosophical objections to the use of happiness as the measure of the overall worth of a person's life to a policy maker. Following this debate, practical problems smearing the blueprint of policy based on self-reported satisfaction levels are discussed (Section 3). Here, we present a simple social welfare function in an attempt to gain some insight into the policy maker's primary goal. Given the endeavour of maximising the utility of the population as a whole, we discuss a menu of paths available to the policy maker when pursuing the `value of life'. Section 4 contains some final thoughts.

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[2] The distinction between philosophical and practical is not very sharp in this paper. The philosophical issues concern the validity of satisfaction questions. The issues concerning the best way to use satisfaction questions are termed practical.

Table 1 Average happiness in selected countries,1995-2005.

Denmark	8.2	Argentina	6.8	Hungary	5.6
Colombia	8.1	Brazil	6.8	Morocco	5.6
Switzerland	8.1	Dominican Republic	6.8	Montenegro	5.5
Australia*	8.0	Singapore	6.8	Slovakia	5.5
Austria	8.0	Venezuela	6.8	South-Africa	5.5
Iceland	7.8	Chile	6.7	Lebanon	5.4
Australia	7.7	Israel	6.7	Algeria	5.2
Finland	7.7	Slovenia	6.7	Jordan	5.2
Sweden	7.7	Uruguay	6.7	Kenya	5.2
Canada	7.6	Indonesia	6.6	Turkey	5.2
Guatemala	7.6	France	6.5	Bosnia	5.1
Ireland	7.6	Thailand**	6.5	Estonia	5.1
Luxembourg	7.6	Greece	6.4	Serbia	5.1
Mexico	7.6	Nigeria	6.4	Romania	5.0
Norway	7.6	Philippines	6.4	Macedonia	4.9
Netherlands	7.5	China	6.3	Mali	4.9
Malta	7.5	India	6.2	Egypt	4.8
USA	7.4	Japan	6.2	Ghana	4.8
Belgium	7.3	Taiwan	6.2	Iraq	4.7
El Salvador	7.2	Vietnam	6.1	Russia	4.4
New Zealand	7.2	Iran	6.0	Pakistan	4.3
Germany	7.2	Peru	6.0	Bulgaria	4.2
Britain	7.1	Portugal	6.0	Georgia	4.1
Honduras	7.1	Croatia	5.9	Belarus	4.0
Kuwait	7.0	Poland	5.9	Armenia	3.7
Saudi Arabia	7.0	South-Korea	5.8	Ukraine	3.6
Cyprus	6.9	Bangladesh	5.7	Moldova	3.5
Italy	6.9	Ivory Coast	5.7	Zimbabwe	3.3
Spain	6.9	Senegal	5.7	Tanzania	3.2

***Sources**: World Database of Happiness.*

**Household, Income and Labour Dynamics in Australia (HILDA) Survey.*

***The Economist Intelligence Unit `Quality of Life' Index.*

2. Some philosophical problems

Two main philosophical issues which arise when assessing the use of research on self-reported satisfaction are discussed. The first issue is whether a government should be interested in self-reported evaluations of individuals. Putting this in broader terms: is the quality of life of an individual determined by his own evaluations and opinions, or is the quality of life of an individual decided by an external authority?

The second issue concerns the question of whether self-reported satisfaction can be considered an empirical measurement of the evaluation by an individual. The debate then focuses on the meaning of self-reported satisfaction and the related question of whether self-reported satisfaction is really `what individuals find important'. After briefly reviewing the first issue, we will review two viewpoints on the second issue, i.e., Nozick's pleasure machine and Sen's contented slave.

2.1 Who decides on the quality of life?

The question of how to decide on what a high quality of life is has been debated in one form or another for thousands of years. Diener and Suh (1998) made a categorisation in those who argue that the quality of life should be measured by an external authority at the aggregate level without direct reference to the opinions and evaluations of individuals, and in those who take the opinions and evaluations of individuals as the only measure of the quality of life and who therefore take the quality of life of the society as a whole to be a function of the quality of life of all individuals.

In the first group we find some sociologists and economists who assess the quality of life of individuals and societies by taking indices of aggregate circumstances they find important. Circumstances like the absence of crime, high literacy levels, high energy consumption, the sustainability of current developments, an equitable income distribution, many political liberties, etc., all can be taken as indicators of a high quality of life. A society with a high quality of life is then one which is able to sustain itself and where there is no crime, inequality, discrimination,

ignorance, violence, hunger, repression, etc. The analysis of self-reported satisfaction is not very relevant to this tradition. Some of these approaches are further expanded in Nussbaum and Sen (1992).

Many individualistic political philosophies (see Kymlicka (1991)), which take the opinions and evaluations of the individual as the measuring rod of the quality of life, belong to the second group.

In classical utilitarianism, as envisaged by Bentham (1798), the sum of individual evaluations, called utility or happiness, is the measure of the total quality of life in a society. In classical utilitarianism, a society with a high quality of life is inhabited by happy inhabitants.

In the Rawlsian version of liberalism, the evaluation of the citizen who is worst of is the measure of the quality of life. The society with a high quality of life is then characterized by a system of rights which ensures that nobody is very unhappy.

In libertarianism (as interpreted by the writings of Kymlicka (1991) and Dworkin (1977)), those freedoms that most `allow individuals to pursue their interests', are the measure of the quality of life. A society with a high quality of life is then inhabited by individuals who are `free' and therefore happy.

These three philosophies share the view that the quality of life of a society derives from the evaluations of individuals of their circumstances. This line of thought is dominant in economics, as reflected by the fact that virtually all social choice rules or social welfare functions in the economic literature are based on the preferences or the evaluations of individuals.

Although we make no comment on the relative validity of these lines of thought, this paper has been written within this latter tradition. Hence, the evaluation of the individual is taken to be the measure of the quality of his life, and the next question is how well the self-reported satisfaction level of the individual reflects this individual's evaluation.

2.2 Nozick's pleasure machine

The libertarian Nozick (1974) argues that if we were given the option of tying ourselves to a `pleasure-machine' which would satisfy all of our needs, most of us would refuse. Nozick argues that this shows that individuals are not actually interested in maximum satisfaction or happiness, and that policy makers should not focus on satisfaction and happiness but on informed preferences. In short, Nozick does not think that self-reported happiness (or satisfaction) is what individuals really find important and hence that self-reported happiness is not an evaluation of their own situation.

There are two problems with Nozick's reasoning. One objection is that he makes an empirical claim without empirical evidence. Whether individuals try to maximize satisfaction is an empirical question.

Secondly, it is questionable whether a pleasure machine can exist at all. Even if we would agree with Nozick's contention that many individuals would not choose to be bound to a machine, this does not imply that individuals are not trying to obtain the highest obtainable satisfaction. The refusal to be tied to a machine can also mean that individuals want their lives to be `meaningful' and want to feel in control of their own lives. Indeed, many psychological studies have found that the ability to control one's own life is very important for life-satisfaction.[3] A pleasure-machine hence seems a contradiction in terms.

2.3 Sen's contented slave

Sen has often expressed his dissatisfaction with the reluctance of mainstream economists to measure individuals' evaluations of their circumstances. He has attacked economists for over-estimating the measurement difficulties and has questioned the reliance of mainstream economists on revealed preference methods (see Nussbaum and Sen (1992)). He has often argued that individual's evaluation of his circumstances, termed utilities, should be measured and not merely assumed (Sen (1987)).

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[3] See, for example, Ryff (1989) for a review and empirical evidence on this matter.

On the issue of whether self-reported levels of happiness or satisfaction can be used to measure individual utilities, however, Sen seems to have his doubts. In Sen (1987), he gives the example of the contented slave, who, through force and adaptation, has learned to be satisfied with his lot. Sen does not think that the high satisfaction level of the contented slave should be the sole criterion for the assessment of the situation of the slave, which leads Sen to advocate `capabilities for functioning' as the measure for the evaluation of the individual's circumstances. Why does Sen distrust self-reported evaluations, such as self-reported happiness or self-reported satisfaction? The following two paragraphs taken from Sen (1987) shed some light:

> *"The battered slave, the broken unemployed, the hopeless destitute, the tamed housewife, may have the courage to desire little, but the fulfillment of those disciplined desires is not a sign of great success and cannot be treated in the same way as the fulfillment of the confident and demanding desires of the better placed."*

and

> *"It is possible to pack more into the notion of happiness than common usage will allow, and to see some objective achievements as part of being `really happy'. If one were somehow stuck with having to make do with the notion of happiness, and base all evaluation on happiness alone, then this type of extension might well form a sensible exercise."*

The way we read these paragraphs is that Sen makes a distinction between `learned to be happy' and `really happy'. Sen's case seems to rest on the possibility that self-reported satisfaction does not mean the same thing to different individuals, i.e. that a rich and `free' person who claims to be satisfied in reality enjoys a more positive mental state than a slave who claims to be satisfied. Again this is a very important empirical claim. Essentially, Sen's hypothesis seems to be that self-reported satisfaction gives information about the extent that an individual has fulfilled the desires he deems attainable. Self-reported satisfaction then does not convey information about a mental state, but a point on an attainable-desire-scale and hence conveys information about the

perceived opportunities for becoming more satisfied. We will call this interpretation of Sen's arguments the information hypothesis. Sen's best known empirical evidence is the fact that women in underdeveloped regions of East-Asia (Bangladesh) are on average at least as happy as men, despite their much inferior socio-economic position (less consumption, more physical abuse, lower social status, etc.).

To contrast the information hypothesis with the basic assumption of the Leyden school that each respondent who claims to be at the same satisfaction level enjoys the same positive mental state, consider the following example. A person earns $1000 dollars in the first month and claims to be `not unsatisfied, not satisfied'. Then, his income rises. In the second month, his income becomes $5000 dollars a month and in all subsequent months, the income of the individual remains $5000 dollars a month. In the second month, the individual claims to be `very satisfied'. In the third month, the individual claims to be `quite satisfied'. In the fourth month and all months thereafter, he claims to be `somewhat satisfied'. How should we interpret the sudden jump and subsequent gradual decline in self-reported satisfaction? Consider first the interpretation according to the information hypothesis: the `real' level of satisfaction jumped from period 1 to 2 and has remained stable since then. The reported level of satisfaction has gone down because the individual has started to be more demanding; he signals his belief that more desires are now attainable by reporting a diminishing satisfaction level.

Consider now the explanation of the Leyden school, which is that the individual in all periods has correctly reported his `real' satisfaction level. The fact that the reported true satisfaction levels have decreased is due to adaptation. The greater desires of the individual have reduced his satisfaction, as the current situation has started to become normal, uninteresting and therefore unsatisfying. This adaptation phenomenon has been termed `preference drift' by Van Praag (1971), but has a long tradition in psychology, where it has also been termed the `hedonic treadmill' (Brinkman and Cambell (1971)). There is hence a difference in the interpretation of the adaptation phenomenon. The difference may seem small and subtle, but it is a vital distinction. Within the information hypothesis, we cannot take the reported satisfaction level of the individual

as an accurate and interpersonally comparable measurement of his actual satisfaction level, whereas we can with the assumptions of the Leyden school. With the information hypothesis, we have to rely on how the researcher evaluates the circumstances of the individual and also his opinion is likely to differ from the opinion of the individual himself.[4]

We must empirically consider the plausibility of the information hypothesis as opposed to the `mental state-hypothesis', the hypothesis that a verbal label denotes the same mental state to everyone in a language community.[5] This is a question of psycho-linguistics. Given that language is learned when one is young, the question of the meaning of normative verbal labels boils down to the question of how children are taught to use normative labels and whether mental states are to some extent observable by others. If it is possible for a teacher (parent, family, guardian, etc.) to observe the mental state of others, it must be possible to teach a child to translate a particular mental state into a normative verbal label. Hence, if we can recognize whether a person enjoys a positive mental state or not, it seems likely that mental states can be described by normative labels.

Two psychological findings lend some support to the idea that we may to some extent observe the mental state of individuals. Firstly, self-reported satisfaction levels have been found to correlate strongly with physiognomical responses, like the number of smiles per day, the amount of brain activity in specific centres, etc. (see e.g. Shizgal (1998) and the references

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[4] It was found in the Leyden literature, and also by others, such as Callan and Nolan (1991) and Benson (1996), that the evaluation of the circumstances of an individual differs markedly with the person doing the evaluating.

[5] Whether individuals will have the same interpretation of normative labels is a different question. Because language must be functional, it does seem very likely that most individuals in a language area interpret normative verbal labels in roughly the same way. This was indeed confirmed by Van Praag (1991), who found that individuals share a common notion of verbal labels such as `very good', `good', `bad', etc. The fact that most individuals will share the same interpretation of normative verbal labels however does not tell us what this shared meaning of normative verbal labels is.

therein). Given that such responses are often unconscious, it seems plausible that they are activated by specific mental states. Secondly, individuals are able to predict the satisfaction level that another individual known to them will report in a survey (see Diener and Lucas (1998)). This suggests that we are able to observe the reasons for an individual reporting a particular satisfaction level. Indeed, it is very common in everyday conversation to make observations about the self-evaluation of other individuals without knowing the circumstances of a person intimately, as reflected in statements like `she seems very happy', `didn't he look miserable?', etc. This again suggests that individuals are able to observe the mental state of another individual, albeit indirectly and imperfectly through body language or perceptions of mood.

The available evidence from psychology hence seems to give some support to the `mental--state-hypothesis' (see also Veenhoven (1996) for a discussion of the available evidence). The evidence is not entirely convincing though as alternative interpretations of the findings are possible. We proceed therefore from the working hypothesis that it is likely that normative verbal labels do convey information as to the mental state of the individual, and hence that self-reported satisfaction levels have content.

3. Practical problems

Suppose that individual self-reported satisfaction levels are ordinally comparable, meaningful, reliable, and the only true index of the quality of life of individuals. Suppose also that we have an ideal data set through which we may know with virtual certainty the effect of every conceivable policy on the distribution of satisfaction. What practical problems then arise when informing policy? To set the scene, we presume that a policy maker wants to maximize a societal welfare function of the following form:

$$W_{\text{government}} = G(u(s_1), u(s_2), .., u(s_N))$$

where N equals the number of individuals and W is the social welfare function the government wants to maximize. The function W is built up in two steps. In the first step, the self-

reported satisfaction level of individual i, denoted by s_i, is transformed to an interpersonally comparable cardinal utility level $u(s_i)$. In the second step, a decision rule G transforms these N individual utilities into a single-index score. Both steps raise several issues. The issues related to the second step are discussed first.

3.1 What exactly does a government want to maximize?

The main issue concerning the decision rule G is whether a government should merely sum individual utilities or whether the distribution of utility should also be important.

In classical utilitarianism, the distribution of utilities is unimportant as the aim is to maximize the sum of individual utilities. This implies G $\equiv$ sum, and $W_g = \sum u(s_i) = \sum u_i$.

In Rawlsian ethics, the distribution of utilities is very important and a government aims to maximize the minimum of individual utility. In that case G $\equiv$ min, and $W_g = \min(u(s_1),..,u(s_N)) = \min_i u_i$.

In a more general version of utilitarianism, one may want to weight the utility of different individuals. Then, a government aims to maximize a weighted sum of utilities, i.e., $W_g = \sum w_i u_i$. This is termed additive utilitarianism here, which treats classical utilitarianism as a special case when each w_i is equal to 1. This latter version of utilitarianism also allows for the case that a government would want to maximize the average level of utility, in which case $w_i = \frac{1}{N}$. This version also allows for decisions which affect many time periods, in which case the weights could depend on time. A choice of G therefore implicitly needs to answer questions about the weight of the utility of future generations. Although the question of weights is still the object of much philosophical and economic debate, we approach this from a positive point of view by assuming that some decision-selection mechanism has led to a government with a particular function G. For expositional reasons, it is assumed that a government aims to maximize the unweighted sum of utilities.

3.2 From s_i to u_i

Suppose that the government knows exactly whose aggregate utility it wants to maximize and, informed by the perfect data-analyst, has perfect information on the causal structure of satisfaction levels. Now, satisfaction levels are measured on a scale of 0 to 10 and are not the same as cardinal utility levels though: one may doubt whether the difference between a satisfaction level of 5 and 6 is the same as the difference between a satisfaction level of 8 and 9. It may well be for instance that individuals avoid extremes which would imply that the difference at the end of the scales is greater than in the middle. We must translate a satisfaction level onto a cardinal scale, i.e., find the function u(.), which will tell us the utility spacing between satisfaction levels.

One approach to the problem of utility spacing between satisfaction answers has been to argue that there is a minimum unit of utility, referred to as the `just perceived increment' or `just perceptible increase', and that each self-reported satisfaction level is a discrete multiple of this minimum.[6] One could then try to find out how many just perceived increments there are between each successive satisfaction answer and via experimentation find how much utility there is between each possible satisfaction answer. The drawback of this approach is that it rests on the untestable assumption that the amount of utility in each just perceived increment is independent of the current satisfaction level. One could very well imagine that at high levels of satisfaction, the just perceived increment in reality denotes a bigger change in utility than the just perceived increment at low levels of satisfaction. One can make an analogy with the speed of movement; virtually everyone will notice the difference between an object that moves at a speed of 5 kilometres and one that moves at 10 kilometres an hour, which roughly correspond to walking and running slowly. Fewer individuals are able to discern the difference between speeds of 30 and 35 kilometres per hour. Yet, the difference in speed is the same. Perhaps the same applies to

[6] See Ng (1996) for a survey of this approach, where the notion of just-perceived increment goes back at least to Edgeworth (1881).

utility differences. Hence the perceptibility of differences in utility need not correspond to the constant absolute differences.

An alternative approach to the utility spacing between satisfaction levels was pursued by Van Praag (1971), was empirically examined by Van Praag (1991) and is also advocated by Parducci (see Parducci (1995)). They argue that the differences in between possible answers are equally spaced, i.e., that there is an equal amount of utility between each successive possible satisfaction answer because individuals interpret such a scale in a relative sense. The argument is that individuals can maximize the amount of information they give if the different possible answers (verbal labels or other descriptors) are equally spaced (Van Praag (1971) and Kapteyn (1977)).

Another argument leading to the same conclusion is that individuals translate their utility onto a relative scale when they are faced with a question on a (0-10) scale because such scales are used in everyday life. Hence, if they treat a questionnaire like any other form of communication, as Schwarz (1995) argues they do, the conventions surrounding (0-10) scales in other situations, such as marking grades at school, would be relevant in this case also. Because (0-10) scales in daily life are used relatively, this would also hold for the answers given by individuals.

If there is an equal amount of utility between each successive possible satisfaction answer, the translation of satisfaction numbers into a relative scale is the same for each policy problem and each sample of respondents. It would mean that the function u(.) is defined up to a linear positive transformation: $u(s_i) = b(\alpha + s_i)$, whereby α can be any number and where the value of *b* is any arbitrary positive number. We can see that any positive *b* leads to the same optimal policy for a constant set of individuals.

The discussion so far has assumed that a government wanted to maximize the utility of a given population (either in one period in in many periods) and that any policy proposal did not affect the number of individuals in the population. Many policies do however affect the number of individuals. Whenever a government makes decisions that affect the health and activities of individuals, these policies are also likely to lead to a change in the number of living individuals in

the given population. Obviously, this will hold for defence policies, health service issues, and major infrastructural programs. It seems like that other policies will also affect the number of living individuals. This raises the issue of how to rate the utility level of a person who dies as a result of policy?[7, 8] We take up this issue next.

3.3 Measuring the value of life

Making important policy decisions involves the use of a value of life. We first discuss some non-happiness based approaches, after which we present a happiness-based approach to the value of life.

Sometimes this value of life is explicit and sometimes it is merely implicit in the sense of the amount of dollars a government is willing to spend to avoid risks of death of its population. For example, when making a cost-benefit analysis of projects which are likely to lead to loss of life (like extensive military exercises), one implicitly or explicitly assumes that a human life is worth a particular amount of dollars (for examples, see Groot et al. (1998)). An explicit amount helps the government to calculate the optimal amount of money it should spend on safety precautions, and allows it to take the same level of precautions in all its projects, rather than have different levels in different situations which would be inefficient and lead to unnecessary loss of life. When extra safety precautions are more costly than the expected value of the gain in life, the safety precautions are not taken.

Similarly, for many organisations who have to take decisions, the value of life is decided by the legal system. For instance, when a company is found to be responsible for an accident leading to loss of life, courts have to decide on the amount of damages paid to the relatives. These

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[7] In terms of the function u(.) this means finding the value of α.

[8] Suppose that under policy option A, two individuals survive who each enjoy s_i. Total welfare then equals $W_A = u_1 + u_2 = 2b(\alpha + s_i)$. Under policy option B one person survives who enjoys s_j, with $s_j > s_i$, which leads to $W_B = b(\alpha + s_j)$. The optimal policy would then depend on the value of α, though not on b: if $\alpha = \infty$ for instance, then $W_A > W_B$ for any value of s_i and s_j.

potential costs lead organisations to take up life-insurances and to make costs to avoid risks to employees. The amount of punitive damages companies have to pay if they are held legally responsible for the death of an individual are explicitly based on the expected income stream of that individual, not on the utility decreasing effect of death. A more satisfactory measurement of the value of human life is therefore a practically relevant challenge (see also Nord (1992), Sloan (1996, ed.), Groot et al. (1998), Cohen (1997), and Danis et al. (1988)).

Another method for finding the value of life is to try and measure the implicit value individuals put on their life as revealed by their choices involving risks of death. For instance, patients for whom some treatments involve a large risk of death have been asked what risk of death they are willing to accept for a particular treatment which would yield a certain increase in the quality of their life if it worked (Danis et al. (1988) and Sloan (1996, ed.)). In industrial economics, hedonic price studies look at the value individuals implicitly put on their life when they have to be compensated for taking risks at the workplace (see Groot et al. (1998), and Viscusi and Aldy (2003)). Table 2 captures a number of studies (across different countries) which employ this latter approach. The jargon within this literature labels the estimates as values of a statistical life (VSL). The estimates range from 200,000 US$ (for Taiwan) to, as high as, 74.1 million US$ (for UK) per life. Such variation demonstrates the sensitivity of the measures to workers' preferences over risk.

Table 2 Summary of labour market studies of the value of a statistical life (VSL).

Author (Year)	Country	VSL *(millions, 2000 US$)*
Thaler and Rosen (1975)	US	$1.0
Marin and Psacharopoulos (1982)	UK	$4.2
Weiss, Maier, and Gerking (1986)	Austria	$3.9, $6.5
Meng (1989)	Canada	$3.9 - $4.7
Meng and Smith (1990)	Canada	$6.5 - $10.3
Kniesner and Leeth (1991)	Japan	$9.7
Kniesner and Leeth (1991)	Australia	$4.2
Cousineau, Lacroix, and Girard (1992)	Canada	$4.6
Martinello and Meng (1992)	Canada	$2.2 - $6.8
Kim and Fishback (1993)	South Korea	$0.8
Siebert and Wei (1994)	UK	$9.4 - $11.5
Lanoie, Pedro, and Latour (1995)	Canada	$19.6 - $21.7
Sandy and Elliott (1996)	UK	$5.2 - $69.4
Shanmugam (1996/7)	India	$1.2, $1.5
Liu, Hammitt, and Liu (1997)	Taiwan	$0.2 - $0.9
Miller, Mulvey, and Norris (1997)	Australia	$11.3 - $19.1
Siebert and Wei (1998)	Hong Kong	$1.7
Liu and Hammitt (1999)	Taiwan	$0.7
Meng and Smith (1999)	Canada	$5.1 - $5.3
Arabsheibani and Marin (2000)	UK	$19.9
Shanmugam (2000)	India	$1.0, $1.4
Baranzini and Ferro Luzzi (2001)	Switzerland	$6.3 - $8.6
Sandy et al. (2001)	UK	$5.7, $74.1
Shanmugam (2001)	India	$4.1
Viscusi and Aldy (2003)	US	$4.7

Source: Viscusi and Aldy (2003)

Similarly, one could ask individuals for the satisfaction level they evaluate just as highly as they evaluate death or one could try to find the value of life by looking at the satisfaction level at which individuals start contemplating suicide. With these approaches, one gets an estimate of the ex ante expectation that individuals have of the value of life.[9] We provide a simple example below.

[9] Since the ex post value of life requires information about what happens when one dies, an accurate estimate of the ex post value of life will probably always elude researchers.

3.3.1 A back-of-the-envelope approach to a happiness-based value of life

A recent approach to measure the importance of life on happiness, introduced by Frijters, Johnston and Shields (2008), focuses on estimating the amount of income an individual should receive after the occurrence of a life-event (such as marriage, divorce, disability, death of a spouse etc.) such that the individual's discounted life satisfaction with the compensation equates to the discounted life satisfaction if the event did not take place. Hence, the authors pursue the monetary reward (punishment) required to offset the reduction (increase) in self-reported life satisfaction that is induced by a given life event.[10]

To determine the required amount of monetary compensation for a life event, Frijters, Johnston and Shields (2008) contrast the discounted life satisfaction effects from the life event (identified as) `major improvement in finances' (e.g. winning the lottery), with the discounted life satisfaction effects from life events needed to be valued (such as `death of a spouse or child'). The authors proceed by keeping count of the number of `major improvements in finances' that are necessary to offset another life-change. Following this, a monetary amount is placed on the amount of money involved with a `major improvement in finances', and similarly with the other life-events.

We now demonstrate how this approach can be used to compute a value of life estimate. The essence is to introduce a new 'variable' that would mean 'being alive for another year' and value that variable, yielding a monetary value of another year of life. The first step in this is to ascertain how much `net satisfaction' a year of life actually entails.

Consider, for example, an individual residing in Australia where (from Table 1) the average life satisfaction level is around 8 (on the 0-10 scale). If we take the satisfaction level of 4

[10] Here, we merely provide a brief outline of the approach. For technical details, refer to appropriate sections in Frijters, Johnston and Shields (2008).

(or below) as being the level at which an individual starts contemplating suicide[11] and hence the level no longer worth living, we can say that our individual enjoys 4 levels of satisfaction over and above her `experience of death' level. Based on this, we can say that the individual's net life satisfaction level is equal to 4 (= 8-4). Hence, the experience of `being alive' is worth on average 4 positive levels of satisfaction per year.

Frijters, Johnston and Shields (2008) estimate a discounted life satisfaction (DLS) ratio for various life events. This estimate indicates how many times the negative discounted life satisfaction effect from a given life event is larger than the positive discounted life satisfaction effect from a major improvement in finances. Following the logic above, the DLS for the life event `being alive' is equal to 4. We proceed now to compute the number of `major improvements in finances' our individual would be willing to forgo (per year) to offset the `experience of death'. To do this, we need to complete the following formula:

*Value of one year = [net life satisfaction ÷ DLS of major financial improvement] * monetary value of a financial improvement*

Using the approach in Frijters et al. (2008), we estimate a value for the denominator of 1.863. Therefore, the DSL ratio of a year of life is 2.147. The monetary value of a financial improvement turns out to be about $120,000 AUD, which in essence derives from the mean windfall income associated with stated financial improvements.[12] We see that each additional year of life is worth around $257,649 AUD. Translating a yearly worth of life into a value of a whole life, we need to scale this figure up to the lifespan of an individual: if we assume the average Australian lives for 80 years and we take a discount rate of 5 per cent (per period), the present

[11] It is the case that the level of health satisfaction of individuals known to die the next year is indeed about 4 in Germany, giving some solidity to the arbitrary number 4 as the most plausible cut-off level of happiness people consider as equivalent to not living at all.

[12] See Frijters, Johnston and Shields (2008).

value of life as a whole at birth would be approximately equal to $5,067,867 AUD (roughly 4,223,230 US$).

Comparing our back-of-the-envelope estimate with that of the studies from Table 2, we see that, although very much a ball-park figure, our value-of-life estimate falls in line with the latest hedonic price approach measures.

4. Conclusions

The main barrier for the use of research on self-reported satisfaction for policy problems is the wide scepticism amongst economists, philosophers and policy makers, as to the meaning and reliability of satisfaction questions.

There is a growing psychological, sociological, and economic literature though that has, with some success, explained satisfaction answers in terms of aggregations of momentary evaluations, and has applied satisfaction research to several areas of policy interest. Individual's evaluations of their lives are now used as a matter of routine in the health service in order to decide on resource allocation. They can be and have been used to measure the shadow value of non-traded goods, such as climate, noise pollution, police protection, children, etc. They can also be used to identify spill-over effects between individuals, as when individuals compare themselves with other individuals and spend inefficient amounts of resources on status races (see Frank (1985)). Ultimately, they could be used for almost any cost-benefit analysis.

Many practical problems are still not satisfactorily solved. The value of life in terms of satisfaction, the question of how individuals space satisfaction answers, whether individuals actually try to maximize satisfaction, and the question of whether individuals' answers are comparable remain issues that attract a lot of research, offer exciting new lines of enquiry, and regularly yield new insights. Although we could give up in the sight of such daunting problems, we may ask what then? Continue to claim that individual utility is immeasurable, and yet carry on measuring `consumer surpluses', `welfare gains', and other concepts which all need individually comparable utilities? Do we assume measurement of utility is impossible and simply choose

whatever utility function we like, rational or bounded, for the theoretical or empirical problem at hand, as is the case in many economic papers? Do we deny that individuals understand what satisfaction means and on the other hand claim that individuals consciously take decisions that maximize a discounted flow of utility from now to eternity? Compared to such common leaps of faith, the practical problems of satisfaction measurement seem small and certainly worth further study.

Despite the practical problems therefore, the future of satisfaction research in economics seems bright, as there are many more non-traded goods to be valued, many spill-over effects to be identified and quantified, and many cost-benefit evaluations to be made on the basis of satisfaction outcomes. One day, economics will be a satisfied customer of satisfaction research.

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