

## Comment

# Reflecting on ‘Valuing lives and life years: anomalies, implications, and an alternative’

THOMAS RICE\*

*Professor, Department of Health Policy and Management, UCLA Fielding School of Public Health, USA*

The task of valuing human life has occupied economists for decades. It is really a thankless one, though, trying to put a value on something that most of the public would say cannot be priced. Oscar Wilde defined a cynic as ‘A man who knows the price of everything and the value of nothing’. It is hardly surprising that people mistakenly think that the quotation is about an economist rather than a cynic, particularly since most in our profession likely believe that such a calculation both can and should be carried out.

This ostensible folly is nicely explicated in the article, ‘Valuing Lives and Life Years: Anomalies, Implications, and an Alternative’, by Paul Dolan, Robert Metcalfe, Vicki Munro, and Michael Christensen (2008). The nuance of the article cannot be captured through a brief summary. In short, however, the authors: examine the many ways in which the profession has sought to measure the value of preventing a fatality (VPF); demonstrate what one should look for in assessing the validity of existing estimates of VPF; show that available estimates do not comport with theory and, moreover, are all over the map; and offer an alternative that, they believe, could productively engage future researchers.

Once one decides to engage in this exercise of valuing the prevention of a fatality, there are many ways to go about it. While the authors don’t mention it, early calculations did not rely on utility measures but instead on the value of lost wages resulting from illness. This method is still sometimes used and is particular popular in valuing wrongful death losses in lawsuits. One notable example was compensation for the victims of the bombings on the World Trade Center and Pentagon on September 11, 2001. The US Congress established a fund for victims’ families. Average payouts were determined by a formula based in part on what victims could have earned for their family; the methodology was extraordinarily controversial. Average awards, for example, were \$1.5 million for those earning between \$25,000 and \$100,000, compared to over \$5 million for those with

\*Correspondence to: Professor Thomas Rice, Department of Health Policy and Management, UCLA Fielding School of Public Health, Campus Box 951772, Los Angeles, CA 90095-1772, USA. Email: [trice@ucla.edu](mailto:trice@ucla.edu)

incomes above \$500,000 (Marsh, 2007). Kenneth Feinberg, who oversaw the calculation of the awards under strict guidelines from Congress, reported that the widow of one firefighter told him, 'I spit on your children' (Schwartz, 2010).

This so-called 'human capital approach' has never sat well with economists either. It ignores subjective well-being, the maximand in consumer theory. There are overwhelming conceptual and practical limitations. On the conceptual side, the formula equates what one earns with what one is worth, which is the shakiest of assumptions. Many would say that a happier life or one that contributes to improving the lives of others is equally or more worthy of societal life-saving resources than merely a more highly remunerated one. Moreover, in coming up with an income-based measure it is nearly impossible to remove all of those elements that society finds unacceptable. We don't want to value those of one racial or ethnic background higher than others, one gender higher than the other, and so on. When one considers how other factors, such as educational level, are largely socially determined, it's hard to develop any convincing breakdown of total value without treating some group unfairly.

For reasons like these, the economics profession has focused on other ways of calculating the value of a life. Common methods reviewed in the Dolan *et al.* article include calculating the extra wages required to get someone to take a risky job, calculating how much is spent on life-saving consumables, or asking people how much they would be willing to pay (accept) for something that would increase (decrease) their chance of survival. As the authors show, in practice these methods do not work very well, and as a result, it's hard to put much confidence in any particular valuation. Tellingly, the authors state that results of previous research 'indicate a very serious problem in estimating the VPF, as they suggest it is possible to generate almost any value based on the size of risk reduction presented to respondents' (p. 284). As a result of these discrepancies, planning agencies in different countries and working with different industries within countries often use very different thresholds for determining whether an investment is worthwhile.

None of this is a surprise. The assumptions of economic theory, such as hyper-rationality of individuals and their ability to obtain and understand complicated information, rarely hold in health care, and are even more precarious when emotion-laded issues such as life and death are at stake. Some examples:

- Those who take risky jobs are often not compensated more because they have little choice or bargaining power. Think of the coal miner's child born in Appalachia region of the United States.
- Investment in life-saving products lack face validity as a measure of VFP. For example, studies have calculated the value of life based on purchases of smoke detectors. (Dardis, 1980). Surveillance research, however, has found in 20% of cases, smoke detectors do not work, usually because of dead batteries (Ahrens, 2014). Should the analyst assume this is a rational choice and therefore subtract 20% from the value of life deriving from such a study? More generally, is it even remotely possible that people make such a cost-benefit calculation when they purchase products like these?

- The same goes for deriving the relative utility of a program that will have, say, a 10 times greater impact on saving lives compared to another program. The authors cite a fascinating study by Desvousges *et al.* (1992) that asked about willingness to pay (WTP) for a program to reduce the chance of an oil spill that would kill 2000, 20,000 or 200,000 birds. The aggregate WTP were almost identical for all three, implying two orders of magnitude of difference if one were to compute VFP (albeit in this case, for another species). The results imply ‘that the responses were driven in large part by attitudes to saving birds and much less so by the number of birds saved’ (p. 290).

Dolan *et al.* review the literature and find that four ‘theoretically irrelevant factors’ affect the VPF. To give one example, it should not matter much at the margin if one is valuing willingness to pay for something that will increase the chance of survival by a tiny percentage, vs willingness to accept a payment for something that will increase the chance of death by that same percentage. In reality, however, willingness-to-pay magnitudes differ by two to eight-fold, probably because people are loss averse.

To me, one of the best demonstrations of the danger of relying on consumer responses for coming up with such values relates to the calculation of discount rates. Economists usually assume an annual discount rate of about 3–10%. But when people are actually surveyed about their preferences for money now vs in the future, they exhibit discount rates on the order of 100% annually (Wang *et al.*, 2011; Shimoga, 2014). If we are going to determine VPF based on surveys with hypothetical scenarios, why do we avoid using the same methodology to populate discount rates in cost-effectiveness analyses?

Is there a better way to come up with a valid and reliable estimate of VPF? Dolan *et al.* provide the outlines of such a method, admitting that ‘the approach is still very much in its infancy in terms of methodology and economic appraisals...’ (p. 292). Basically, they suggest that the analyst calculate the income compensation necessary for moving from one state of health to another. Derived from a utility function, they propose a regression equation,

$$SWB_i = \beta_0 + \beta_1 Y_i + \beta_2 H_i + B'X + \varepsilon_i$$

where SWB is the subjective well-being,  $Y$  the household income,  $H$  is health state,  $X$  is a vector of personal and social characteristics, and ‘ $i$ ’ represents an individual. To illustrate, we could take a random sample of the population, ask questions that quantify SWB and health status, and then calculate  $\beta_1$  and  $\beta_2$  to determine how much people need to be compensated, say, for a reduction in health. This works better for life years than VPF, but it would be easy to convert the former to the latter.

The authors argue that ‘SWB can avoid many of the problems inherent in individual preferences, particularly those that are elicited in unfamiliar contexts, and it avoids the focusing effect since respondents are not asked to attribute anything to their experienced utility...’ (p. 292).

A method like this has its own challenges. Subjective well-being is measured with error and, as the authors note, might or might not be an accurate measure of true or underlying well-being. Moreover, if one wants to make estimates of value for

subgroups of the population rather than coming up with a single number for the VPF, there is a concern that such subgroups may perceive their own SWB differently.

Other major concerns are omitted variables bias and reverse causality. It is essential that the  $X$  vector in the equation be able to capture the key factors affecting SWB besides health and income. If omitted factors are correlated with either, then the income compensation tradeoff calculation will be biased. To list one hypothetical potentially omitted variable, consider an optimistic outlook on life. This could be correlated with both the measures of SWB and health, with its omission biasing the coefficient  $\beta_2$  upward and skewing the income-health relationship. Moreover, depending on the measure used for health, the direction of causality might also be an issue: reporting a higher SWB may color a person's report of her health, also biasing the relationship. These are all issues that can and should be further pursued as more research is conducted in this area.

Continuing research on the value of life is critical. The British National Institute for Health and Care Excellence (NICE) 'generally recommends funding interventions with a cost per quality adjusted life year gained less than £30,000' (p. 279) in spite of many estimates that this threshold is far too low. In the U.S., by contrast, cost-effectiveness ratios are prohibited from being used to determine either coverage or reimbursement of services under public insurance programs. More convincing research on appropriate thresholds can only foster best practices within and across countries.

But at the same time, economists need to recognize social preferences more broadly. In many if not most countries, the public may not tolerate allocation schemes based strictly on calculations of VPF. Richardson and McKie (2005) illustrate how population preferences may deviate from those advocated by economic theory. In one of their examples, they note that when scarce organs need to be rationed, theory would suggest that those receiving priority should be the least severely ill because 'maximum health gain would be achieved by giving this group priority'. In reality, though, we usually give priority to those with the most severe illness. They continue, 'this policy can only be described as "perverse", however, if health gain is the overriding social objective. In the present case, health care is explicitly of secondary importance to severity' (p. 269).

Their second example is a concept called 'The Rule of Rescue'. Why do we persist, for example, in spending great sums of money trying to save miners stuck underground after a catastrophe even after there is very little chance they could be rescued? And why would we give a third liver to someone whose body rejected the first two? The authors answer:

These practices manifest a psychological imperative that is hard to resist: namely, the imperative to rescue *identifiable* individuals facing avoidable death, without giving too much thought to the opportunity cost of doing so. People cannot stand idly by when an identified person's life is visibly threatened if rescue measures are available' (McKie and Richardson, 2003: 2408).

But isn't this bad policy, rescuing those who just happen to be in the news and ignoring countless others who are not? Are not 'those anonymous individuals who quietly die from preventable cancers in hospital wards ... no less real than the trapped miner?' (p. 2415). Their answer is that observers benefit just from knowing that an attempt to help the victim is being made, and moreover, that people want to live in a 'humane' society whose members don't stand idly by in the face of calamities; the victim could have been anyone, including themselves.

McKie and Richardson's summation is apt:

There is probably no unambiguous advice that may be offered to health economists, health service researchers or policy makers except to remember that the evaluation of health services is not simply a technical matter but a quintessentially ethical endeavor, and that in complex societies with divergent values there may be a range of considerations that may 'trump' the utilitarian rationality (p. 2417).

## References

- Ahrens, M. (2014), *Smoke Alarms in U.S. Home Fires*, Quincy, Massachusetts: National Fire Protection Association. <http://www.nfpa.org/~media/Files/Research/NFPA%20reports/Fire%20Protection%20Systems/ossmokealarms.ashx> [March 30, 2015].
- Dardis, R. (1980), 'The value of a life: new evidence from the marketplace', *American Economic Review*, 70(5): 1077–1082.
- Desvousges, W. H., F. R. Johnson, R. W. Dunford, K. J. Boyle, S. P. Hudson and K. N. Wilson (1992), *Measuring Nonuse Damages Using Contingent Valuation: An Experimental Evaluation of Accuracy*, Research Triangle Park, North Carolina: RTI Press.
- Dolan, P., R. Metcalfe, V. Munro and M. C. Christensen (2008), 'Valuing lives and life years: anomalies, implications, and an alternative', *Health Economics, Policy and Law*, 3: 277–280.
- Marsh, B. (2007), 'Putting a Price on the Priceless: One Life.' *New York Times*. September 9. [http://www.nytimes.com/2007/09/09/weekinreview/09marsh.html?\\_r=1](http://www.nytimes.com/2007/09/09/weekinreview/09marsh.html?_r=1), [March 30, 2015].
- McKie, J. and J. Richardson (2003), 'The rule of rescue', *Social Science & Medicine*, 56: 2407–2419.
- Richardson, J. and J. McKie (2005), 'Empiricism, ethics and orthodox economic theory: what is the appropriate basis for decision-making in the health sector?', *Social Science & Medicine*, 60: 265–275.
- Schwartz, J. (2010), 'For Kenneth Feinberg, more delicate diplomacy'. *New York Times*. July 16. [http://www.nytimes.com/2010/07/17/us/17feinberg.html?pagewanted=all&\\_r=0](http://www.nytimes.com/2010/07/17/us/17feinberg.html?pagewanted=all&_r=0), [March 30, 2015].
- Shimoga, S. (2014), 'Influence of time preferences on health behaviors among Mexicans: essays from health economics & behavioral economics perspectives'. Dissertation, University of California, Los Angeles, Fielding School of Public Health, Department of Health Policy and Management.
- Wang, M., M. O. Rieger and T. Hens (2011), *How Time Preferences Differ: Evidence from 45 Countries*, Norwegian School of Economics. [https://ideas.repec.org/p/hhs/nhhfms/2011\\_018.html](https://ideas.repec.org/p/hhs/nhhfms/2011_018.html).