Graham Loomes *Warwick Business School*

Eliciting Values for Health and Life when Preferences are… Elusive

Many environmental and other public sector interventions involve possible impacts on length and quality of life

(How) can we obtain monetary values which can be applied confidently and consistently across domains?

More in the spirit of a workshop than a conference, I'll take a look at one way of trying to address this issue

More questions than answers (I hope you'll suggest some, though)

First question: ***what*** to value?

Reducing the risk of premature death – VSL / VPF? (defined as . . .)

If so, the same value across domains?

Transport Work Home Crime
Natural disasters Unnatural disasters Air pollution

Or, since we all die, should it be life expectancy based – VOLY?

Or, to adjust for quality and encompass things that may not affect life expectancy much, should it be QALY-based?

Is the value of reducing my risk of road death (say) this year simply equal to the value of reducing the risk of losing the X years of quality-adjusted life expectancy I would have if I survive the next 5,000 miles?

Early SP studies to elicit VPFs just asked directly:

What would you be willing to pay for a safety feature that reduces your risk of dying in an RTA in the next ***t*** years by ***x*** in 100,000?

But they were dogged by the same sorts of procedural/scope problems encountered when valuing environmental goods via SP

Turning hard-to-imagine risks of hard-to-imagine outcomes into sums of money all in one go was too demanding

So could we break it down into more digestible components?
And then put the parts together to give a coherent whole?

Three parts:

A: Money value of preventing short-term health state

B: Relativity between that health state for a limited time and the same state for remaining life

C: Acceptable risk of death to ‘cure’ remaining life in that state

Try it yourself . . .

A: Money value of preventing short-term health state

During the next 12 months you will suffer an episode of stomach discomfort and sickness every couple of weeks, with each episode lasting 2 or 3 days
These episodes are not too severe but may interfere with some of your normal activities
After 12 months you return to your current health with no further effects from this illness

What is your **WTP** to avoid this illness and its effects on your life during the next 12 months?

B: Relativity between that health state for a limited time and the same state for remaining life

Consider a choice between suffering that illness for certain for 12 months, or taking a treatment which gives you a 90% chance of avoiding the illness altogether, but involves a 10% chance that the treatment might fail and leave you worse off, so that you would experience this pattern of illness for the rest of your life

Which option would you choose?

Subsequent questions vary the risk iteratively until a ‘best estimate’ is achieved

What is the maximum ***p%*** chance of the lifetime illness you would accept in order to have a 100-p% chance of avoiding the 12-month illness altogether and remaining in your current state of health?

C: Acceptable risk of death to ‘cure’ remaining life in that state

This time the choice is between the certainty of suffering that state of health for the rest of your life, or a treatment which gives you a 90% chance of remaining in your current health but which carries a 10% risk of death if it fails

Which option would you choose?

. . . . .

What is the maximum ***q%*** chance of death you would accept in order to have a 100-q% chance of avoiding the illness altogether and remaining in your current state of health?

Person 1

A: Money value of preventing 12-month illness

£10 per week: £500 in total

B: Relativity between that health state for a limited time and the same state for remaining life

$p = 0.05$

C: Acceptable risk of death to 'cure' remaining life in that state

$q = 0.02$

Person 1

A: £500 **B:** p = 0.05 **C:** q = 0.02

If set u(normal health) = 1 and u(dead) = 0

C is interpreted as u(this health state) = 0.98

So suffering this illness for 1 year means losing 0.02 of a QALY

A tells us that Person 1 is WTP £500 to avoid that loss, so for such a person, a QALY is valued at £25,000

B tells us that Person 1 weights the rest of life as 20 times the current year, so that subjective (discounted) remaining life is regarded as 20 years, worth 20 x £25k = £500,000: Person 1's VPF

Person 2

A: £2,000 **B:** $p = 0.02$ **C:** $q = 0.001$

C is interpreted as u(this health state) = 0.999

So for Person 2, suffering this illness for 1 year means losing 0.001 of a QALY

In conjunction with **A**, a Person 2 QALY is valued at £2,000,000

B tells us that Person 2 weights the rest of life as 50 times the current year, so that Person 2's VPF = £100,000,000

Even if P1s were to outnumber P2s 9 to 1, the sample mean VPF – advocated as the appropriate measure to use – is > £10 million (more than 5 times the current value, and 20 times the median)

Such a range is not untypical

And ‘raw’ means have been very high

So outliers have been ‘trimmed’

But on what grounds? On what basis can we conclude that either Person 1 or Person 2 have given unacceptable answers and should be disenfranchised (or capped)?

More fundamentally, is it right to ‘reduce’ the value of remaining life to the sum of the (constant) value of remaining QALYs?

Can’t older people in poorer health and/or with fewer years left be just/almost as averse to dying on the M5 as the average driver?

Could this be accommodated by some nonlinear function . . . ?

An example, where VPF is higher for greater RLE, while extensions of life expectancy are more valuable when you have less time left

In 2007, the roads VPF was around £1.4m and NICE valued a QALY at £30k

Using those values for the typical RTA fatality, involving the loss of 40 years RLE, we found that $\alpha = 675$ and $\beta = 0.80$ gave the table on the right

The £1.4m and £30k numbers are different now (and open to debate) but the general idea of linking variable VPF and variable VOLY/QALY may still be appealing

$$\text{VPF} = \alpha D^{\beta} \text{ with } D \geq 1, \ \alpha > 0 \text{ and } 0 < \beta < 1$$

ε (years unless otherwise stated)	VPF (£)	VOLY equivalent (average implied by difference between successive VPFs)* (£)
80	2,525,000	25,500
70	2,270,000	26,500
60	2,005,000	27,500
50	1,730,000	28,500
40	1,450,000	30,000
30	1,150,000	32,000
20	830,000	35,000
10	480,000	43,500
2	132,000	56,000
1	76,000	
2 months	18,100	92,000
1 month	10,400	
2 weeks	5,575	124,000
1 week	3,200	