Australian Government
Department of the Prime Minister and Cabinet
Office of Best Practice Regulation

Best Practice Regulation Guidance Note Value of statistical life

August 2020

Key Points:

- Willingness to pay is the appropriate way to estimate the value of reductions in the risk of physical harm – known as the value of statistical life.
- Based on international and Australian research a credible estimate of the value of statistical life is $5.0m and the value of statistical life year is $217,000 in 2020 dollars.
- There are complicating assumptions used to derive these estimates so a sensitivity analysis should be undertaken as part of the cost-benefit analysis.

This note provides guidance on how officers preparing the cost-benefit analysis in Regulation Impact Statements should treat the benefits of regulations designed to reduce the risk of physical harm.

A number of regulatory proposals are aimed at reducing the risk of physical harm, for example, occupational health and safety laws, warning labels on tobacco products and transport safety measures such as seat belt laws. This raises the issue of how to measure and articulate this benefit in a Regulation Impact Statement. Different methods have been proposed for valuing reductions in the risk of physical harm and this note sets out a method most appropriate for the best practice regulation process.

Value of Statistical Life

A key concept is the *value of a statistical life* (VSL) which is an estimate of the value society places on reducing the risk of dying. By convention the life is assumed to be the life of a young adult with at least 40 years of life ahead. It is a statistical life because it is not the life of any particular person. A related concept is the *value of a statistical life year (VLY)*, which is an estimate of the value society places on a year of life. The value of a statistical life is most appropriately measured by estimating how much society is willing to pay to reduce the risk of death. However, there are different methods of measuring society's willingness to pay to reduce the risk of death.

- One direct method is to ask individuals through a survey what they would pay to reduce the risk of dying. There is evidence that willingness to pay surveys overestimate willingness to pay when compared to actual consumer choices subject to a budget constraint (Brown et al., 1996; Neill et al., 1994; Bishop and Heberlein, 1979).

- One method which incorporates a budget constraint is to observe how much consumers pay for products that reduce the risk of death or injury, for example, the purchase of safety items in a car.
- Another indirect method is to observe how much workers are willing to pay (through reduced wages) for an improvement in workplace safety.

A number of empirical studies have derived estimates for the value of a statistical life using the above methods. Following a review of research into VSL and VLY and of international guidelines for life and health values, Abelson (2007) suggested public agencies adopt a VSL of $3.5m, a constant VLY of $151,000 which is independent of age, and age-specific VSLs for older persons equal to the present value of future VLYs of $151,000 discounted by a private time preference discount rate of 3 per cent per annum. Each of these are measured in 2007 dollars.

Importantly, the research into VSL and VLY, including Abelson (2007), argues that the estimates should vary according to the characteristics of the people affected and the nature of the risk or hazard. For example, society may be willing to forgo more to prevent the death of a young person, or to avoid conditions that significantly reduce quality of life.

Guidance for preparing Regulation Impact Statements

Ideally the value of statistical life would be estimated for each regulatory proposal taking into account the types of risks addressed and the people affected. However, as noted by the US EPA, this is likely to be too costly for most proposals.

For this reason, and consistent with the advice of international regulatory agencies (USEPA 2000), the OBPR advises officers preparing RISs to use estimates derived from previous studies. Although now dated, the Abelson estimates of VSL and VLY were based on empirical evidence that had been assessed to ensure that it was comprehensive and rigorous, and remain the best estimates of VSL and VLY for public agencies to use. Using ABS Wage Price Index data[1] to express these estimates in 2020 dollars gives a VSL of $5.0 million, and a VLY of $217,000 based on a private time preference discount rate of 3 per cent.

Applying the estimate

A regulatory proposal is expected to reduce the number of workplace fatalities. It will take two years for industry to implement. It will prevent one death in the first year, two deaths in

[1] Australian Bureau of Statistics, *Wage Price Index*, Cat. No. 6345.0, Table 1, Column G.

the second year and three deaths each year when it has been fully implemented. It is expected to cost industry $5 million each year during implementation and $2 million each year after it is fully implemented. The regulation is expected to be reviewed after nine years. The steps to estimate the net present value of the proposal are set out in Table 1 below (a 7 per cent real discount rate is used in this hypothetical example). The base year of the proposal is 2020.

Over the life of the regulation (nine years), the proposal will prevent 24 deaths. It will cost industry $24 million to comply with the proposal. The net present value is [0.0+4.7+11.4+10.6+9.9+9.3+8.7+8.1+7.6 =] $70.2 million.

Table 1: Application of discount rates to value of statistical life

Year	***2020***	***2021***	***2022***	***2023***	***2024***	***2025***	***2026***	***2027***	***2028***
Deaths prevented	1	2	3	3	3	3	3	3	3
VSL ($m)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Benefits[a] ($m)	5.0	10.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Costs ($m)	5.0	5.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Net Benefit ($m)	0.0	5.0	13.0	13.0	13.0	13.0	13.0	13.0	13.0
Discount factor	1.0	1.07^1	1.07^2	1.07^3	1.07^4	1.07^5	1.07^6	1.07^7	1.07^8
Discounted benefit[b] ($m)	0.0	4.7	11.4	10.6	9.9	9.3	8.7	8.1	7.6

[a] benefit = deaths prevented * VSL. [b] discounted benefit = net benefit/discount factor.

Note that in the example above, the key assumptions that determine the net present value are the costs imposed on business to comply with the regulation and the number of lives likely to be saved. When conducting sensitivity analysis, it is these parameters that should be changed (rather than making arbitrary changes to the VSL or the discount rate).

Injury, disease and disability

Many regulations have the benefit of reducing the risk of injury, disease or disability. One method to value these benefits is to adjust the value of statistical life year (which could be interpreted as the value of a year of life free of injury, disease and disability) by a factor that accounts for the type of injury, disease or disability. The Australian Institute of Health and Welfare has published disability weights for most diseases and injuries that can be used to adjust the VLY (Mathers et al 1999, pp. 186-202). As an example, an amputated foot has a disability weight of 0.3, which equates to 30 per cent of a VLY or $65,100 per year (0.3*$217,000) when measured in 2020 dollars.

References:

Abelson 2007, *Establishing a Monetary Value for Lives Saved: Issues and Controversies*, Working Papers in Cost benefit Analysis WP 2008-2, Department of Finance and Deregulation, https://www.pmc.gov.au/sites/default/files/publications/Working_paper_2_Peter_Abelson.pdf (accessed 26 October 2018)

Bishop, R. and Heberlein T. 1979, 'Measuring Values of Extramarket Goods: Are Direct Measures Biased?' *American Journal of Agricultural Economics*, vol. 61, pp. 926-930.

Brown, T., Champ, P., Bishop, R. and McCollum, D. 1996, 'Which response format reveals the truth about donations to a public good?' *Land Economics,* vol. 72, pp. 152-66.

USEPA (United States Environmental Protection Agency) 2000, *Guidelines for Preparing Economic Analyses*, Office of the Administrator, EPA 240-R-00-003, September.

Mathers C., Vos T., and Stevenson C. 1999, *The burden of disease and injury in Australia*, AIHW cat. no. PHE 17, AIHW, Canberra.

Neill, H., Cummings, R., Ganderton, P., Harrison, G. and McGuckin T. 1994, 'Hypothetical Surveys and Real Economic Commitments', *Land Economics,* vol. 70, pp. 145-54.

Viscusi, W. 2003, 'The value of a statistical life: a critical review of market estimates throughout the world', Journal of Risk and Uncertainty, vol. 27(1), pp. 5-76