Recommended Interim Values for the Value of Preventing a Fatality in DG Environment Cost Benefit Analysis

Reference Values

Best estimate

In general, contingent valuation studies of the value of preventing a statistical transport fatality indicate a value of around €1.5m. For example, work by the UK's Department of the Environment, Transport and the Regions' gives a figure for transport fatalities of around £1m (1998 prices). Uprating this to 2000 prices and exchanging it into Euros using Purchasing Power Parity gives a reference figure of around €1.4m**.** Adjusting for the age of mortality victims usually associated with environmental pollution produces a figure of **around €1.0m (2000 prices).**

Upper estimate

The recommended upper estimate is based on a review of earlier valuation studies provides the recommended upper estimate of Euro3.5m. Adjusting for the age of mortality victims usually associated with environmental pollution produces a figure of **around €2.5m (2000 prices).**

Lower estimate

Preliminary results from Alan Krupnick and Maureen Cropper's analysis include a figure of C$800,000 in 1999 prices. Uprating this to 2000 prices and exchanging it into Euros using Purchasing Power Parity gives a reference figure of **around €0.65m (2000 prices)**.

Notes on these Estimates

These estimates were developed on the basis of a DG Environment workshop for experts held in Brussels on November 13th 2000. However, whilst based on the general discussion at the workshop, they should not be seen as representing the opinions of any individual expert at the workshop. These estimates are interim values and DG Environment notes the need to carry out further research to refine them for future use, and will update them as and when evidence becomes available.

These estimates should be used for the value of preventing a fatality in the environmental context where small reductions in risk occur over a large population. They are applicable to deaths in a largely elderly population where the reduction in life expectancy is likely to be short - maybe one year or less.

Given their interim nature, and the significant caveats around much of the existing empirical literature, the use of ranges to reflect sensitivity analysis is important. For this reason, 'best', 'upper' and 'lower' estimates are provided. The 'best' estimate should be treated as the central estimate with the 'upper' and 'lower' figures used for sensitivity analysis.

Adjusting for Context

Latency

In the case of chronic or latent effects, there is a delay between the emission and the impact. For example, carcinogenic emissions will have a latency period whilst the impacts of particulate matter depend on cumulative exposure.

It is appropriate to value future impacts at a lower rate than contemporaneous impacts. The central discount rate to be used in discounting the value of future impacts is **4% real**. However, sensitivity analysis should be carried out using a value of **2% real**, this represents an assumption that real wages will be rising over time and that the value of small reductions in future risks will increase accordingly.

The following table shows the discount factors to be applied under both of these rates.

Time until impact would occur	10 years	15 years	20 years	30 years
Central rate of 4% real	67,56%	55,53%	45,64%	30,83%
Sensitivity analysis based on rate of 2% real	82,03%	74,30%	67,30%	55,21%

Carcinogenic Pollutants

People may be willing to pay more to reduce their risk of dying from cancer than to reduce their risk of a fatal heart attack, because death from cancer may be preceded by a long period of serious illness. The value attributed to the risk of mortality from cancer should be treated the same as for other illnesses (i.e. the same Value of Preventing a Fatality). However, it is important that the "cancer premium" relating to the period of ill health prior to death is also captured. However, the evidence on the size of this "cancer premium" for the period of morbidity is minimal.

A central assumption for the value of the "cancer premium" is that it is equivalent to 50% of the standard reference values above. In other words, the "mid-range" estimate for the period of ill health and the mortality together changes from €1m to €1.5m whilst the lower range value becomes €1m and the upper range value becomes €3.8m.

It is important not to double count the period of ill health. To repeat, the central value of €1.5m includes both €1.0m attributable to the mortality incident and €0.5m attributable to the period of ill health before death.

Age

Note that the reference values are based on an elderly population and relatively small reductions in life expectancy. There are strong theoretical and empirical grounds for believing that the value for preventing a fatality declines with age and that this is represented in these reference values (explicitly for the mid-range and upper figures). If, say, a carcinogenic pollution affects a population with a more average age, then it is reasonable to adjust for this. For example, if the population included all ages, then multiplying by 1.43 would correct for the original age-adjustment factor of 0.7.

Health Status

There is some dispute over whether we are willing to pay less to reduce the risk of death if the alternative is poor health. This is particularly important as air pollution often affects elderly people already in a poor state of health. Given the conflicting existing empirical evidence, it does not seem appropriate to adjust for the health status of the population at risk.

Adjusting for different populations within the European Union

The recommended values are designed for application to the population of the EU. However, willingness (and ability) to pay for reductions in risk varies with income. There is therefore a question about whether these values should be adjusted where the population at risk in the EU. For example, the average per capita income in Germany is above the EU15 average so should the benefits of risk reduction be valued higher there and therefore emissions reduced accordingly? Or, more contentiously, should less stringent standards for emissions be set in countries with below average per capita incomes?

However, it is not recommended that values be changed according to the income of the population affected. In other words, the same central values should be used throughout the EU countries. The first reason for this decision is purely ethical - EU countries do not discriminate within their own populations on the basis of income and it is not right that the EU should do so either. Secondly, whilst, theoretically, willingness to pay varies with income, it also changes with a number of cultural factors and their influence may be greater than that of income alone. Therefore without hard empirical evidence it would be misleading to adjust between populations solely on the basis of income. Finally, there will be scope for EU countries to reflect their own particular situations and values under subsidiarity.

Adjusting for the populations of the Accession States

The same arguments made above for adjustments within and between European populations can also be made for the application of these values to Accession Countries. However, the differences in income are larger between the accession countries and the EU15 and this makes it much more likely that the value of preventing a fatality in these countries is lower. It is recommended that the EU15 figures should be adjusted for differences in purchasing power parity.

Annex A

Examples

Example 1: Policy would reduce risk of mortality to a population of 2 million people by a factor of 1 in 10,000.

Best estimate of benefits equals €200m (2m people x €1m x 0.0001), with a lower estimate of €130m and an upper estimate of €500m.

Example 2: Policy would reduce risk of mortality to a population of 2 million people by a factor of 1 in 10,000 but these mortality incidents would not occur for 10 years.

Best estimate of benefits equals €135m (2m people x €1m x 0.0001 x 0.6756), with a lower estimate of €88m (based on the central discount rate of 4 per cent real) and an upper estimate of €410m (based on the lower discount rate of 2 per cent real).

Example 3: Policy would reduce risk of mortality from a carcinogenic pollution to a population of 2 million people by a factor of 1 in 10,000 but the mortality incidents would not occur for 10 years.

Best estimate of benefits equals €203m (2m people x €1m x 0.0001 x 0.6756 x 1.5), with a lower estimate of €132m (based on the central discount rate of 4 per cent real) and an upper estimate of €615m (based on the lower discount rate of 2 per cent real).

Example 4: Policy would reduce risk of mortality to a population of 2 million people by a factor of 1 in 10,000. The population affected would have an average age of 40 and a 'normal' life expectancy of around 30 years.

Best estimate of benefits equals €286m (2m people x €1m x 0.0001 x 1.43), with a lower estimate of €186m and an upper estimate of €715m.