Economic Valuation of Mortality Risk Reduction: Assessing the State of the Art for Policy Applications

PROCEEDINGS
*B**Session II**B*
Panel Discussion: International Perspectives on Valuing Mortality Risk for Policy

A workshop sponsored by the
US Environmental Protection Agency=s
National Center for Environmental Economics
and National Center for Environmental Research

November 6, 2001
The Holiday Inn Silver Spring Hotel
8777 Georgia Avenue
Silver Spring, MD 20910

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Acknowledgements

Sections of this report indicated as Asummarizations@ were prepared by Abt Associates Inc. with funding from the National Center for Environmental Economics. Abt Associates wishes to thank Nicole Owens and Kelly Maguire of EPA's National Center for Environmental Economics.

Disclaimer

Although the information in this document has been funded in part by the United States Environmental Protection Agency under Contract # 68-W6-0055 to Stratus Consulting Inc., it may not necessarily reflect the views of the Agency and no official endorsement should be inferred.

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Value of Statistical Life in Europe
--Working Paper*--

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*This is a working paper developed for the US Environmental Protection Agency National Center for Environmental Economics and National Center for Environmental Research's workshop, "Economic Valuation of Mortality Risk Reduction: Assessing the State of the Art for Policy Applications," held November 6-7, 2001 at the Holiday Inn Silver Spring Hotel in Silver Spring, MD.

Value of statistical life in Europe

A paper given EPA's Environmental Policy and Economics Workshop Series
Economic Valuation of Mortality Risk Reduction:
Assessing the State of the Art for Policy

Panel Discussion:
International Perspectives on Valuing Mortality Risk for Policy
November 6 and 7, 2001, Silver Spring, Maryland, US.

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Introduction

The panelists were asked to comment on four topics:

1. A brief background on the use of benefit-analysis at your organisation.
2. How does your organisation value reductions in mortality risks, including information on whether and how your agency deals with age, type of risk, and latency.
3. How has your organisation arrived at its current policy recommendations? For example, does your organization rely on outside groups (such as an advisory board)? What studies or information was considered?
4. What are your highest priority research needs, and what research is your organisation funding, supporting, or conducting?

This paper responds to the above questions.

1. Use of benefit-analysis in the European Union

The European Commission has a treaty obligation to consider costs and benefits of all European Union (EU) wide legislation, as stated in the Amsterdam Treaty (Art 175): *"In preparing its policy on the environment, the Community shall take account of the potential benefits and costs of action or lack of action"*. It should be noted that in the EU, only the UK has a national policy statement or its equivalent which explicitly requires the consideration of the social costs and benefits of government proposals (as is also the case in Canada and the US (RPA 1998). In addition, in the proposed 6th Environmental Action Programme, the European Commission stated that it will make even better use of a "knowledge based approach" implying *inter alia* that the costs and benefits of EU legislation will be based as far as possible on sound science.

The Commission has a fairly long tradition of carrying out cost-effectiveness and cost-benefit studies e.g. as part of its climate, air quality and waste related legislation. An example of the Commission's benefit analysis work is *"Economic evaluation of a directive on national emission ceilings for certain atmospheric pollutants"*[2] published in 1999.

2. Valuation in the EU of reductions in mortality risks, including adjustments with age, type of risk, and latency

DG Environment does not believe that reliable estimates for the environmental context are yet available. This means a reference value is needed to act as an anchor, and to form the basis for adjustments to fit the environmental context. Based on expert advice (see

[2] The benefit estimates can be found in http://europa.eu.int/comm/environment/enveco/air/benefits.pdf.
A list of recent studies looking at costs and/or benefits in the context of EU-wide legislation can be found at http://europa.eu.int/comm/environment/enveco/index.htm.

below) DG Environment has established that stated preference-based figures provide the best reference value.

Given the significant uncertainty around the existing empirical literature, the use of ranges to reflect sensitivity analysis is desirable. For this reason, 'best', 'upper' and 'lower' estimates were chosen by DG Environment. The 'best' estimate was to be treated as the central estimate with the 'upper' and 'lower' figures used for sensitivity analysis.

1. **Upper Limit** - Although there was general discontent with its hedonic-wage based underpinnings, it was recognised that the **ExternE value** of around €3.5m (2000 prices) could be seen as an upper limit for the VOSL.

2. **Best Estimate** - The UK Department of the Environment, Transport and the Regions' figure for VOSL in transport was thought to offer a strong starting point. It was noted that this figure, before transfer to the environmental context, of €1.4m (2000 prices) is principally based upon a number of consistent Contingent Valuation Method (CVM) studies and therefore has strong theoretical and practical underpinnings.

3. **Lower Estimate** - It was decided to use the preliminary results of a survey technique being used to help determine the value of improving ambient air quality in Canada[3]. The survey technique asks for the willingness to pay for a reduction in risk of death in the context of environmental quality. The preliminary results are that willingness to pay is lower than currently thought and includes a value of €0.65m (2000 prices) for older people valuing risk.

2.1 Adjustment for age

As changes in environmental quality tend to affect older people with lower life expectancy, the expert advice on this issue was particularly important. There are strong theoretical and empirical grounds for believing that the value for preventing a fatality declines with age. There was some agreement amongst the experts that **the central reference value could be transferred from its transport context to a person aged 70 by multiplying it by 0.7 resulting in a best estimate of €1.0m**

2.2 Adjustment for type of risk

On the type of risk (i.e. the cause of death), and cancer in particular, there is little evidence, and what evidence there is conflicts, on whether people value changes in cancer risks more than changes in other risks. Also, values might be biased by misperceptions of the likelihood of the risks involved. **The value attributed to the risk of mortality from cancer is therefore treated the same as for other illnesses** (i.e. the standard best estimate).

[3] See http://www.rff.org/methods/non_mkt.htm for details of Resources for the Future work on this topic.

However, people may be willing to pay more to reduce their risk of dying from cancer because death from cancer may be preceded by a long period of serious illness. This "cancer premium" - relating to the period of ill health prior to death - needs to be captured. Although evidence on it 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 sum, for cancer, the "best" estimate for the period of ill health and the mortality together increases from €1.4m to €2.1m (assuming person of average age).**

2.3 Adjustment for latency

In the case of chronic or latent effects, there is a delay between the emission and the impact. The standard DG Environment discount rate of 4% real is therefore used for discounting future impacts. Sensitivity analysis is carried out using a value of 2% real, representing an assumption that real wages will be rising over time and that the value of small reductions in future risks will increase accordingly.

3. How did DG Environment arrive at its current policy recommendations?

In benefit assessments concerning air quality, the value of reducing the risk of fatalities can often be 80% of the total benefits when health impacts are expressed in monetary terms. The Commission had largely relied on the ExternE values[4]. These values are based on a review of literature in the early 1990s that focused on US hedonic wage-risk studies. This value (€3.2m at 1999 price level) has been used to calculate a Value of Life Years Lost for use in sensitivity analysis. The staff in the Economic Analysis Unit[5] of the Directorate General Environment of the European Commission were uneasy about the values used partly because they were not thought to be theoretically correct. Further, as DG Environment did not have guidelines on how to carry out benefit assessment each consultant could in practice choose how to apply and adjust the ExternE values. This *ad-hoc*ism rendered benefit analyses uncomparable.

In order to remedy this situation, the Environment DG decided to hold a workshop on the *Value of Reducing the Risk of Ill-Health or a Fatal Illness* to take stock of the state of the art. The purposes of the workshop were i) to establish the best current estimates of the monetary value of preventing the risk of ill-health or of a fatal illness to be included within the DG Environment's guidelines and ii) to identify research needs. This one-day workshop was held in Brussels on 13 November 2000. It brought together ten valuation

[4] The Externalities of Energy (ExternE) project is the first comprehensive attempt to use a consistent 'bottom-up' methodology to evaluate the external costs associated with a range of different fuel cycles. The European Commission launched the project in collaboration with the US Department of Energy in 1991. For further information see http://externe.jrc.es/.

[5] Due to a recent reorganisation of DG Environment, Sustainable Development Unit has taken over functions of methodological development of cost-benefit analysis while economic analysis of air quality and climate issues was decentralised to “Air Quality and Noise” and “Climate Change” units respectively.

experts from the EU and the US to examine methodology and findings based on contributions from experts[6]. The number of participants was deliberately kept low in order to establish a free flowing but focussed discussion in the workshop. In the Environment DG we considered this workshop extremely successful as we have been able to issue concise recommendations for interim values for statistical life and now have a clear idea of where to move next. We have also been able to take advantage of the expert advice to choose stated preference approaches over hedonic-wage approaches – a critical determinant of the monetary value finally chosen.

It is unlikely that DG Environment would establish a formal council or advisory board on the benefit issues. Instead, the current thinking is that whenever there is a need to establish interim values for benefit estimates, an ad hoc expert meeting would be called upon (for instance, the Air and Noise Unit will organize a workshop on what value of noise one should apply in mid December 2001). Moreover, DG Environment works in close cooperation with DG Research, which finances much of the scientific research also in this field (e.g. ExternE, NewExt[7], Environmental Valuation in Europe[8]). DG Environment does consider it very important that research findings would be disseminated quickly to policy makers. Thus, it will finance adding more studies to the Environmental Valuation Reference Index (EVRI)[9] database developed by Environment Canada and the EPA.

4. Highest priority research needs, including research funded, supported, or conducted by the European Commission

In order to carry out its Treaty obligation to assess the costs and benefits of environmental legislation, DG Environment needs to have reference values that it can provide for analysts carrying out CBAs. After the completion of the NewExt project we may organise a second *ad hoc* workshop where that, and other evidence would be assessed and the interim values used by DG Environment might be revised, if sufficient evidence surfaces to do so. It is not likely that DG Environment would carry out primary analysis in the field of value of life. However, while DG Environment is currently content with its interim value of statistical life, it might also need similar interim reference values for morbidity.

The European Commission has 36 different Directorates General and other services and it can call upon the services of a number of European agencies (e.g. European Environment Agency). Naturally it can also tap into to the research carried out by the Member States of the European Union. The different DGs finance various topics that are linked with the

[6] The papers were prepared by Maureen Cropper, David Pearce, and a presentation was made by Alan Krupnick. These papers, the proceedings of the workshop and the recommendations can be found at http://europa.eu.int/comm/environment/enveco/others/value_of_life.htm

[7] http://www.ier.uni-stuttgart.de/public/abt/tfu/projekte/newext/index.html

[8] http://www.landecon.cam.ac.uk/eve/

[9] For details, see e.g. Navrud and Vågnes (2000)

value of statistical life and thus one clear priority for DG Environment would be simply to know what research is already being carried out. The most important ones are NewExt and ExternE but there may be others. In addition DG Environment can promote specific topics to be included under the Sixth Framework Programme on Research, which starts in 2003.

The participants of the workshop **"***Value of Reducing the Risk of Ill-Health or a Fatal Illness* (see above) suggested that the following research action be carried out:

- There is a need for a **mortality study** across the EU and the accession countries relating specifically to environmental contexts. It was noted that the Krupnick and Cropper methodology is to be applied to Japan, Korea, and the US. In addition, as part of the NewExt project, the methodology will be used (with a sample size of 400) in, Italy, France and the UK and possibly in Spain. These surveys go part of the way towards meeting this need, but their coverage in Europe needs to be extended. Also, it may be possible to feed in preliminary results from the DETR analysis in February into its' application.

- To facilitate benefits transfer, there is a need for further research on how values for morbidity and mortality vary with income. In particular, for transfer to the Candidate Countries - many of which have very low incomes compared to the EU15 average.

- More research is needed on most of the **contextual factors** and, in particular, on how willingness to pay to reduce risk varies with the health status of the respondent.

- For estimates of the cost of **morbidity**, more research is needed in particular on chronic morbidity, duration of illness, definition of symptoms and the cost of illnesses to children. Specific estimates of the costs of morbidity also need to be developed for the accession countries. -
- A **literature survey and meta analysis** on the use of stated preference in the transport sector is needed to inform us on the rigour of any reference value. It is unlikely that the Environment DG will finance such meta-analysis given its current budgetary constraints.

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International Perspectives on Valuing Mortality Risk for Policy: A Canadian Perspective

--Working Paper*--

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*This is a working paper developed for the US Environmental Protection Agency National Center for Environmental Economics and National Center for Environmental Research's workshop, "Economic Valuation of Mortality Risk Reduction: Assessing the State of the Art for Policy Applications," held November 6-7, 2001 at the Holiday Inn Silver Spring Hotel in Silver Spring, MD.

International Perspectives on Valuing Mortality Risk for Policy: A Canadian Perspective

Economic Valuation of Mortality Risk Reduction: Assessing the State of the Art for Policy Applications

Environmental Policy and Economics Workshop Series
USEPA and NCEE, Washington D.C.

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November 6, 2001

Health Canada Santé Canada

Outline

1. The use of benefits valuation results
2. How changes in mortality risks are valued
3. How values are obtained
4. Highest priority research needs

Health Canada Santé Canada

1. Background: The use of benefits valuation results

- Federal departments are subject to directives regarding benefits valuation (analogous to US E.O.)
- Valuation results applied to issues
  - Environmental health; Product safety; Tobacco control; Elicit drugs; Occupational health and safety
  - Policy appraisal; Program evaluation; Environmental health assessments; Advocacy; Priority setting; Indicators; Effective incentive/disincentive design (e.g. taxes, economic instruments)

Health Canada Santé Canada

2. How mortality risk are valued

- Presently rely on range of estimates transferred from existing meta and review studies - General central value: $5 million
- "Attempts" to adjust for:
  - age or longevity
  - type of risk
  - latency

Health Canada Santé Canada

3. How values are obtained

- Consulted with experts and leading practitioners in mortality risk valuation
  - Primary and secondary analyses
- Reviewed by Division's Economic Science Advisory Group
  - Advises if based on sound economic science principles and sate of the art methods
- Occasionally submit to independent external review bodies (Royal Society of Canada)

Health Canada Santé Canada

4. Highest priority research needs supported and funded

- ISSUES: age and longevity; understanding the type and extent of risk changes; latency; altruism; gains/loss ...
- Must continue to better understand existing literature
  - Preference calibration (RTI); meta analysis (IEc)
- Targeted primary research
  - Drinking water, attribute based (DeShazo-Cameron), WTP/WTA (Hanemann-Knetsch)

Health Canada Santé Canada

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Health Canada Santé Canada

UK Perspective on Valuing Mortality Risk in the Air Pollution Context
--Working Paper*--

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UK PERSPECTIVE ON VALUING MORTALITY RISK IN THE AIR POLLUTION CONTEXT

1. A brief background on the use of benefit-analysis at your organization.

The purpose of this short paper is to present a UK perspective on valuing mortality risk for policy. The main discussion presented here is from the perspective of valuing mortality risks in the air pollution context but firstly, the paper sets out the general policy appraisal background in the UK.

Policy Appraisal Background in the UK

It is a fundamental principle of UK Government policy that the costs and benefits of any proposed policy or regulation are fully integrated into Government decision making. This is achieved through policy appraisal and a formal requirement to undertake regulatory impact assessments. The UK has a long tradition (over several decades) of appraisal based on cost benefit analysis which has been promoted from the centre of government. This has been strengthened by accumulated experience in its use in various contexts, initially largely for infrastructure projects but gradually extended to cover all policy appraisal. Recently, the need for sound assessment of options in any public sector decision has been reiterated by the 1999 "Modernising Government" White Paper which emphasises the role of "evidence based policy".

Since the early 1990s there has been steady progress in the UK in developing, applying and refining policy appraisal techniques to aid the decision maker with regard to environmental protection issues. We define appraisal as the process of first identifying and examining options and then of systematically assessing the costs and benefits of actions to ensure an integrated and fully informed decision-making process. Wherever possible and practical, we attempt to quantify the environmental impacts of any proposed policy or regulation in monetary terms. Where monetary evaluation is not possible or practical, Government policy is to quantify effects, or failing that, to undertake a qualitative assessment.

Other policy contexts, notably that of roads and the work place, have made use of mortality valuation in policy appraisal for some time. In 1987 the (then) Department of Transport (DoT) formally adopted a monetary value for deaths caused by road accidents. This is referred to as the value for the prevention of a road accident fatality (VPF) and is made up of loss of output; ambulance and medical costs; and human cost. Human cost reflects the intrinsic loss of enjoyment of life and is estimated using a willingness to pay (WTP) approach. The VPF is currently valued by the Department of Transport, Local Government and the Regions (DTLR) at about £1.1m per fatal casualty prevented (2000 prices). The road safety VPF (value for prevention of a fatality) is also considered applicable to the context of work place accidents.

Benefits-Analysis of Air Quality Policy

The Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland [DETR, 2000] defines air quality standards for eight major pollutants and sets objectives for reductions in the concentrations of these pollutants to be achieved by 2003-05. Considerable progress has been made on the economic appraisal of air quality policies, in particular with the setting up of the Inter-departmental Group on Costs and Benefits (IGCB) following the first AQS in 1997. The IGCB was set up to provide as comprehensive an assessment as possible of the costs and benefits associated with measures to meet current or proposed strategy objectives.

The IGCB published an interim report in January 1999[10]. This report presented the methodology adopted by the IGCB and preliminary results. It provided an assessment of the additional costs and benefits of the 1997 strategy objectives but recommended that a substantial amount of further research was required so that a more detailed economic analysis could be conducted. In particular, while the health benefits of reductions in air pollution were quantified in terms of number of cases (e.g. reductions in deaths brought forward), the report did not monetise these benefits. This was due to a lack of agreed estimates of willingness to pay to avoid the risks associated with air pollution.

[10] "An Economic Analysis of the National Air Quality Strategy Objectives", DETR, 1999

The approach to monetary valuation of health benefits from reductions in air pollution has been informed in the UK by an ad-hoc expert group – the Economic Appraisal of Health Effects of Air Pollution (EAHEAP) – set up by the Department of Health. EAHEAP were asked to advise on whether the monetary valuation of health effects is appropriate and, if so, whether appropriate values could be derived.

When the EAHEAP group examined the different ways in which benefits to health of the reductions in air pollution could be expressed, they decided that the Willingness to Pay (WTP) approach was the most suitable method to use. The report, however, notes the lack of direct empirical evidence on monetary valuation of the reduction in risk of death brought forward by air pollution. It therefore concluded that it would not be appropriate to apply empirical evidence on monetary valuation of the reduction in risk of deaths in accidents directly, and without adjustment, to the air pollution context. The report went on to provide some guidance on what range of WTP values might be accepted for acute deaths brought forward by air pollution but acknowledged the extensive uncertainties in the range of estimates presented.

Department of Health Ministers considered the results of the EAHEAP group and decided that the currently available data did not allow the benefits to health of reducing air pollution to be converted into monetary terms with a sufficient degree of certainty to allow the results to be used in the cost benefit analysis of the NAQS. Therefore, the health benefits were presented in quantitative terms in the interim IGCB Report and monetised health benefits were presented only for illustrative purposes.

A Second IGCB Report was published in September 2001[11] to present the economic analysis undertaken to support proposals to strengthen the Air Quality Strategy (AQS) objectives for particles. The work takes forward the earlier report of the IGCB in a number of significant ways – most notably by including estimates of long-term health effects. But as in the interim IGCB Report, it does not monetise the health benefits,

[11] "An Economic Analysis to Inform the Review of the Air Quality Strategy Objectives for Particles", DEFRA, 2001

although it does present implied valuations in terms of "cost of added life year saved"[12].

While, currently we do not use monetary values for health extensively for the appraisal of air quality policies, this is seen as a priority research area. A key recommendation of the EAHEAP Report [Department of Health, 1999] and the interim IGCB Report was to undertake empirical studies of WTP for reduction in risks to health associated in the air pollution context. This is being taken forward in a DEFRA study, "Valuation of health benefits associated with reductions in air pollution" which looks to reduce the uncertainty associated with the monetary valuation of health effects. It is hoped that once this study is completed in 2002/03, this will enable more robust valuations to be included in the evidence base for policy decisions.

2. How does your organisation value reductions in mortality risks, including information on whether and how your agency deals with age, type of risk, and latency.

Three main distinctions are made in terms of mortality risks in the air pollution context:

Acute mortality;

Chronic mortality;

Cancer mortality.

More attention to date has been placed on acute mortality valuation in the UK, as discussed below. This has been partly because until recently, the epidemiological evidence has been considered more robust to quantify acute mortality effects than chronic or cancer-related mortality.

Acute mortality valuation

One important problem which the members of EAHEAP addressed was the lack of willingness to pay studies that focused on the risks associated with exposure to air pollutants. Because of this, when considering the monetisation of reduced risks of acute

[12] For illustrative purposes, to compare the chronic mortality benefits against the costs, it was necessary to calculate the present value of the stream of the estimated annual costs over the same period as the benefits and to calculate an implied "cost of added life year".

deaths, i.e., less deaths brought forward, the group adopted a baseline figure derived from the willingness to pay to reduce the risk of death in other contexts and adjusted the value to take account of a range of factors that are likely to apply to the special case of risks associated with exposure to air pollutants. These adjustments included taking into account: the advanced age of those most likely to be affected by air pollution; the extent of shortening of life likely to be induced by exposure to air pollutants and the poor quality of life likely to be experienced by those at greatest risk, i.e., those suffering from chronic heart and lung disease. A major difficulty is that the extent of shortening of life that occurs when death is brought forward as a result of exposure to air pollutants is not known. The Group adjusted for a range of shortening of life from a month to a year. This range was, to some extent, an arbitrary choice though it was based on the clinical judgement of the physicians who were members of or advisers to the group.

Given the uncertainties, the estimate for the aggregate willingness to pay to reduce the risk of a death brought forward was given as a wide range from £2,600 to £1.4m (1996 prices). The minimum value was derived under the assumption of a loss in life expectancy of 1 month in very poor health; EAHEAP illustrate that a loss of life expectancy of 1 year would have a minimum value of £110,000 (1996 prices) using a similar approach. For a summary of the adjustments that EAHEAP considered, see diagram at end of paper.

The methodological basis for the values is the UK road accident Value for Prevention of a Fatality (VPF) which is based on stated preference surveys and has undergone significant peer review. This research showed that a WTP in the range £750,000 to £1,250,000 could be regarded as broadly acceptable. A decision was made to use the mid-point of this range as the basis for the value of preventing a fatality which would imply a baseline figure of approximately £1 million (1997 prices) [Beattie et al, 2000[13]].

[13] "The Valuation of Benefits of Health and Safety Control. Summary and Technical Report", HSE Books, Contract Research Report 273/2000.

Factors relating to risk context

EAHEAP factored up the air pollution baseline VPF up by 2-3 times on the basis that air pollution risks are perceived as involuntary, poorly understood and not under individual's control and also to take account of literature reviews in various contexts which suggested an air pollution VPF in the range £2-2.5 million. EAHEAP based this on evidence such as that reported in Jones-Lee [1995] and discussed further in the NERA/CASPAR report [1998]. Recent UK government research [Beattie et al, 2000] indicates that preferences are affected by whether the hazard is perceived to be subject to personal control and voluntariness. In this study, respondents typically felt they had least control over railway accidents and fires in public places, followed by car accidents, then domestic fires. However, the study also found that VPFs are not substantially dissimilar in the different safety contexts showing that this factor alone does not necessarily count as a good reason to use different VPFs. Moreover, if is often hard to judge whether risk is voluntary or involuntary. For these reasons, it has recently been agreed within the department's Appraisal Group that the road safety VPF should not be adjusted upwards to account for the involuntary nature of the risk in the air pollution context.

Adjustments for age

EAHEAP note that there are strong theoretical and empirical grounds for believing that in any context, the VPF can be expected to decline with age, at least after middle age. The results from Beattie [2000] pointed towards an inverted U life cycle for the roads VPF. Based on these results, the adjustment factor for the over 65 age group – used by EAHEAP to match the affected group for acute mortality – is 70% of WTP at an average age of 40 which yields an adjusted VPF of £1.4 million. However, recent studies show that WTP falls with age but only after the age of 70; further studies may therefore be required to test the relationship between WTP and age.

Adjustments for life expectancy

Those affected have a lower life expectancy than average for their years. Their life expectancy is not known with any certainty, but EAHEAP made the assumption that it was between 1 month and 1 year. EAHEAP noted that although this would be expected to reduce WTP it was unclear to what extent. The approach EAHEAP take

is to provide some bounds on the values by arguing that the minimum values could be derived in proportion to life expectancy lost. In the case of death being brought forward by a year compared with an average life expectancy in that age group of 12 years, EAHEAP derive a value which is 1/12th of the VPF adjusted for age of £1.4m at £120,000. A similar approach is used in the case of death being brought forward by only a month which results in a value of £10,000.

Adjustments for Quality of life

EAHEAP argued that the fact that those affected also have a lower quality of life than average for their age would also be expected to reduce WTP since people are expected to pay more for further time in good health than in poor health. However, EAHEAP were uncertain to what extent this would depress WTP. Moreover, to date, the empirical evidence does not appear conclusive linking those who are in poor health to lower WTP.

Chronic mortality valuation

EAHEAP did not specifically consider valuation in the context of chronic mortality and therefore provided no suggested ranges for valuation, although they did note that the same method they used for valuing acute mortality could, in principle, be applied to the valuation of chronic mortality risks.

Another option that was briefly considered by EAHEAP was valuing years of life lost. This has the advantage that it is convenient for the quantification of chronic mortality which estimates the number of life years saved from a reduction in air pollution. In its simplest terms, a value of life year could be regarded as an annuity which when discounted over the expected life years remaining of an individual would sum to the baseline valuation (VOSL).

While it is generally accepted that willingness to pay will be affected by remaining life expectancy, it is not clear that this approach is an appropriate method to deal with it . WTP is likely to depend on a lot more than remaining life span and the VOLY approach may be rather arbitrary. For this reason, EAHEAP rejected the simplistic version of valuing a life year lost but did not have time to explore more sophisticated versions taking into account more factors than numbers of years alone (for example,

evidence on how willingness to pay is affected by age). An alternative method is to derive empirical estimates of WTP for different gains in life expectancy. This is the approach being taken in the DEFRA health valuation study for the valuation of chronic mortality benefits.

Adjustments for Latency

There is also the issue of how to take account of the time lag that will usually occur between first exposure to the pollution that results in chronic effects and the eventual death from such effects. The key questions are therefore what future value to associate with the prevention of a fatality which would occur at some future date and what discount rate to apply. EAHEAP argue that the appropriate procedure is to value the prevention of a future fatality on the same basis as a current fatality in the same age group but to discount the future benefit at the pure time preference rate for utility[14]. An alternative approach to deal with latency is to ask people directly to value future benefits. an approach the current health valuation study has been piloting.

Cancer mortality valuation

In general, cancer-related mortality is not quantified in air quality policies in the UK. This is because the evidence for risk of cancer is based on occupational exposures and a lot of uncertainty surrounds quantification of these risks at much lower levels of exposure such as those encountered in ambient air.

It has been argued that the valuation of mortality in the context of cancer may be entirely different to the valuation of mortality in other contexts such as that of a sudden accident or acute mortality. EAHEAP argued that in the case of cancer-related mortality the air pollution VPF should be adjusted upwards from £2 million to £2.5 million to take account of a risk that people are known to dread over and above other mortality risks but the adjustment is not based on empirical evidence. Other government departments, such as HSE (Health & Safety Executive) use the roads VPF as their baseline but recognise there are factors which could raise the VPF (including the "dread" factor and higher health care costs). The HSE cancer value is

[14] This can be thought of as equivalent to inflating the value by expected income growth times income elasticity and then discounting at the preferred government discount rate.

therefore doubled to take account of these factors but it is accepted that there is no empirical basis for this doubling.

3. How has your organization arrived at its current policy recommendations? For example, does your organization rely on outside groups (such as an advisory board)? What studies or information was considered?

The UK has its own peer review such as through a joint DEFRA/DTLR Appraisal Group and an inter-departmental Group on Environmental Costs and Benefits. In addition, advice from academics has long been an important source of quality control for appraisals. It is recognised that any methodological errors could undermine the credibility of CBA as a basis for policy, and as a way of maintaining quality it is common practice to provide for academic input in various ways: using academic contractors to undertake appraisals, using "expert groups" to supervise or comment on work, and having Academic Panels to give general input and exchange of ideas between government and the academic community.

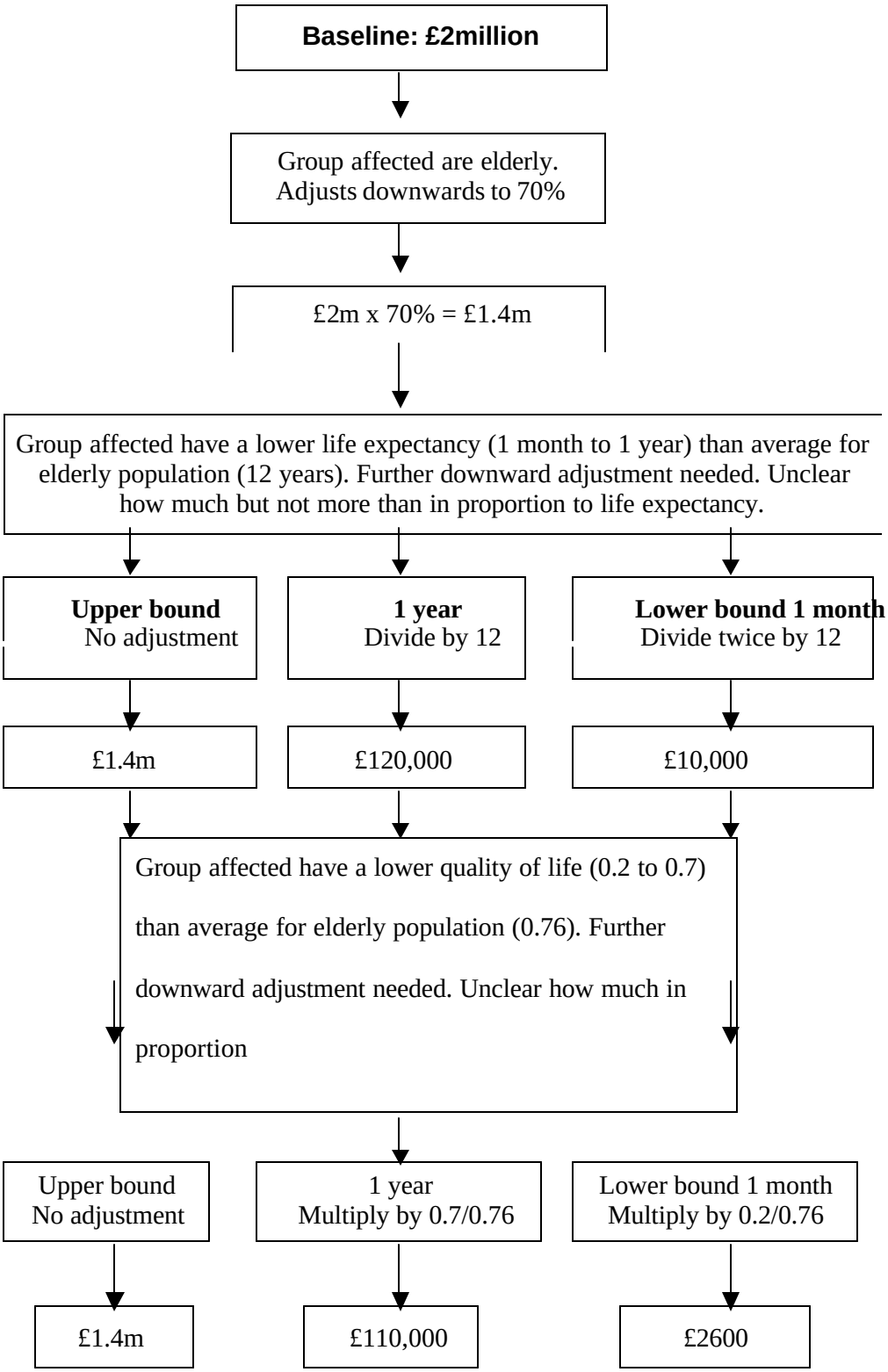
In the air pollution context, the Department of Health have set up the Committee on the Medical Effects of Air Pollution (COMEAP) to advise on the effects of air pollution on health in the UK. In 1998 COMEAP published a report "Quantification of the Effects of Air Pollution on Health in the UK". COMEAP provides on-going advice on which health effects associated with air pollution can be quantified with sufficient robustness, given the epidemiological evidence. As discussed above, an ah-hoc expert group – the Economic Appraisal of Health Effects of Air Pollution (EAHEAP) – was set up by the Department of Health to advise on how best to reflect the importance of health effects in any cost/benefit decisions in air quality policy and in particular to consider whether monetary valuation of health effects is appropriate and, if so, whether appropriate values could be derived. The EAHEAP Report [1999] primarily addressed methodological issues and was seen as a first step in an area not previously considered in any detail.

4. What are your highest priority research needs, and what research is your organization funding, supporting, or conducting?

A key recommendation of the EAHEAP Report [Department of Health, 1999] and the interim IGCB Report was to undertake empirical studies of WTP for reduction in risks to health associated in the air pollution context. This is being taken forward in a DEFRA study, "Valuation of health benefits associated with reductions in air pollution" which looks to reduce the uncertainty associated with the monetary valuation of health effects. The aim of this project is to generate empirical estimates of how much people in the UK are willing to pay for reductions in health risks associated with air pollution. The study aims to generate values for a range of health effects of air pollution with importance placed on generating both mortality (acute and chronic) and morbidity valuations. However, the study is not expected to be completed until 2002/03 and therefore the results are not yet available for use in cost-benefit analysis. However, this research could be potentially very important in subsequent policy reviews, enabling more robust valuations to be included in the evidence base for policy decisions.

Other research includes a study that is shortly to be commissioned by HSE to investigate public preferences for preventing fatalities due to "dreaded" risks which will inform on this issue for both DEFRA and HSE. The results should be available in two years time.

EAHEAP: SUMMARY OF POSSIBLE ADJUSTMENTS
FOR ACUTE MORTALITY VALUATION



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Question and Answer Period for Session II

Alan Krupnick, of Resources for the Future, referring to the discussion earlier in the morning about some of the ethical issues associated with using different values of statistical life for different risks, different populations, and different contexts, asked if this issue has at all surfaced in either the European community more generally or in the UK or in Canada. He also asked if the research strategy that the EC representative (Matti Vainio) was thinking of using would try to take this into account at all.

Matti Vainio (of the EC) responded that they decided to take the same view as has been taken by the U.S. EPA – if you do European-wide analysis, you use the European central valley. With regard to accession countries, whose GDP per capita is less than one tenth that of European countries, he said that the recommendation was to use a different approach (which he acknowledged to be illogical) in which they would have the PPP-adjusted GDP as a weight for the accession countries. He noted, however, that this begs the question of what to do when those accession countries become part of the union. Finally, he mentioned two European projects, CAFÉ, Clean Air For Europe, and MERLIN, a model which includes valuing improved air quality, that can be found on the web.

Paul DeCivita (of Canada) noted that, although the issue of income (and VSLs) is not yet a burning issue in Canada, there is a large misunderstanding about the use and meaning of VSLs, not only within the stakeholder community and with public policy decision makers, but also among the traditional or non-public health economists. He said the struggle to continue to educate and to explain what they're doing and find more innovative ways to do it is still a very high priority, and it is something that they need to constantly be doing.

Helen Dunn (of the UK) noted that, while they expect willingness to pay to be affected by income levels, there is no suggestion that they apply different willingness to pay, that they would instead apply a UK average which takes account of those different income levels. Secondly, she said that as part of the health valuation work they're doing they plan to "feed back" to people some of the results they are getting to get a sense of how people feel about what this implies for policy.

Ron McHugh, of the EPA, asked Paul DeCivita a two-part operational question. First, Canada deals with latency by discounting back the present values over which the cancer presumably is latent. He asked, how is this latency period determined? He noted that when he has posed the same question to the U.S.'s National Cancer Institute, they "scratch their heads" about when the cancer first became extant but latent. Second, he asked how they operationalize the period over which the cancer is actually active. He cited non-Hodgekins lymphoma, where the difference between diagnosis and death is about 22 years, versus pancreatic cancer, where it might be as low as six months.

Paul DeCivita said that they ask their epidemiologists for latency period determinations, and value accordingly. As to the second part of the question, he acknowledged that they are still not really anywhere close to having an elegant way of dealing with this.

Responding to this, Ron McHugh wondered aloud how these epidemiologists come up with an estimate. He said the people he has asked respond that they can't know when the cancer first entered the body, and that therefore it is an attempt to know the unknowable.

Subhrendu Pattanayak, of Research Triangle Institute, asked the panelists to comment, given the larger role of the state and the size of the social security net and the role of the state in the medical care industry in Europe and Canada (compared with the U.S.), on whether there are other institutional issues which either affect the way people make choices or their perceptions of risk that should be considered in a research agenda.

Paul DeCivita responded that one of the burning questions that they have had for a long time is how accurate international benefits transfers are. He said the assumption in Canada is that the set of values is pretty much the same between Canada and the U.S., but this assumption has not really been formally tested.

J.R. DeShazo noted that another way of getting at the question (of differences in VSL across different people in a population) is to try and use some of our valuation techniques to elicit preferences on distributional justice and willingness to pay, in addition to the traditional focus on private marginal willingness to pay for risk reductions. He put the question to all three of the panelists, who come from traditions that have involved themselves in more redistribution than in the U.S., whether or not that has been a consideration.

Helen Dunn replied that this is something that they (in the UK) have been thinking about in their current health valuation study. In the pilot work, she said, they have been considering different question formats. In one, willingness to pay is at the private individual or possibly household level. A second matching question is asking people to act as more of a social decision maker. She agreed that the equity issues are important and said it is an area they are struggling with.

Glenn Harrison, of the University of South Carolina, picked up the theme of social willingness to pay versus individual willingness to pay, and suggested a semantic clarification. In the Clean Air Act, he noted, the EPA pointed out that they are trying to estimate social willingness to pay and that social willingness to pay is stated to be the sum of individuals' willingness to pay. He hypothesized that social willingness to pay could, alternatively, be estimated by directly going to politicians, or directly going to individual citizens and asking a referendum type question. He said that heretofore we have been using individual willingness to pay as a way to estimate social willingness to pay, consistent with the notions of consumer or voter sovereignty. He noted that these are two very different concepts with interesting implications for the choice of method. He then turned this into a question to the panelists, and particularly to Matti Vainio: To what extent is the EU, as he believes the EPA is, introducing these considerations in an ad hoc, ex post way, rather than being honest about them up front?

In response, Matti Vainio attempted to put the EU work into a context. He said they are required to do cost-benefit analysis when they come up with a regulation and directives, and they do it, basically, to answer the question: Are the benefits of this higher than the costs? Doing it that way, they hope that at least in the design phase of any directive, most of the important questions are answered. They do not use cost-benefit analysis as an optimization tool, he said, because they do not have nearly enough information. He commented that, in dealing with so heterogeneous a group of member states, they cannot be as consistent as they would like to be, and that they are learning from what researchers in the U.S. are doing, and in a sense trying to pull some of the member states along, some of which are very skeptical about these kinds of approaches in the first place. They are thus playing an educational role to some extent. And the UK, he noted, is clearly the "leader of the pack" in this.

Ted Miller, of the Pacific Institute for Research and Evaluation, commented that in the United States, an analysis back in the Reagan era showed that if government regulates to too high a level, it kills more people than it saves, and that there can be too high a life value. He cited the debate in Scandinavia over zero vision, where they were trying to set a goal of eliminating all road safety deaths, as an instance in Europe in which this same concept was brought up. That may be the upper bound, he suggested, that lets us say, as we look at the range of value of life estimates, "these are the ones that, even if they were correct, are beyond what we should use in regulation." He asked if there has been any discussion in the environmental regulatory analysis context within Europe, or in Canada, of this concept.

Paul DeCivita responded that they (in Canada) had never really entertained that issue, but that they would follow up on it.

Matti Vainio concurred. He noted, however, that there is a notion that they somehow are using values that are too high. But, he added, who knows what the right values are?

Peter Belenky, of the Department of Transportation, addressed his question to the audience in general. He noted that studies done in different places at different times are brought to a comparable basis by using adjustment factors. After a value is adopted for policy purposes, it is adjusted for inflation or income growth or whatever else is appropriate. He asked if any procedures for updating the adopted values have been established, or if there are the credible or acceptable studies distinguished on the basis of which method they employ to do this.