Valuation of Health Impacts in ExternE

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Need for valuation

- Epidemiological evidence of link between air pollutants (PM, SO2, O3, NO2 & CO) and premature death & illness
- Focus here on mortality effects since have dominated previous benefit analyses of air quality policy

Epidemiological characterization of mortality impacts

- "Acute" impacts – short term exposure to pollutants leads to deaths easily attributable to exposure $\Rightarrow$ VSL
- "Chronic" impacts – long term exposure to pollutants leads to deaths, but that are not directly attributable. Can only observe life expectancy loss over whole population $\Rightarrow$ VLYL

Valuation practice to date

- Empirical valuation studies
  - Risk – based: e.g. risks in work-place compensated by higher wages; expenditure on safety measures in transport

  $\Rightarrow$ VSL estimates
  - Problematic since e.g.

    a) not same size of risk changes as in air policy context;

    b) Different age groups impacted

Examples of VSL

- ExternE (1998) Euro 3.1 million
- DG Environment Euro 1 million
- US EPA $3.7 million
  ($6.1mn including wage risk)

Measurement of VLYL

- Need derives from
  - epidemiological unit of measurement
  - Simple way of adjusting for age (since impacts primarily affect elderly)
- Method to date in ExternE
  - Convert VSL estimate to discounted stream of annual life year values over remaining lifetime (based on population survival probabilities)
  - **Problem:** Assumes linearity between VSL and LE.

Examples of VLYL used in policy analysis

Source	Year of price level	VLYL	Comment
ExternE (1998)	1995	€0.12 million €0.084 million	acute (short term) effects chronic (long term) effects Both estimates use 3% discount rate. Derived from VSL
EAHEAP (1999)		€0.18 million	Cited as a VOSL figure, but specific to a loss of 1 year of life
NewExt(2003)		€0.044 million	Based on conversion from VSL
USEPA (2003)	1999	€0.18-0.3 million €0.45-0.53 million	<65 years, depending on discount rate >65 years, depending on discount rate

Valuing premature death: New evidence

- EC NEWEXT Research project
  - Survey-based method; adapts existing method derived in N. American studies
  - Undertaken in 3 EU countries
  - WTP 5:1000$_{1\text{-}10}$; 1:1000$_{1\text{-}10}$; 5:1000$_{70\text{-}80}$

  $\Rightarrow$ country-specific and pooled analysis

NEWEXT Pooled Results

- VSL of € 1.045m (based on WTP $5:1000_{1\text{-}10}$)
- Recommend as **central value** since first question asked; easier risk change to understand)
- VSL of € 3.3m (based on WTP $1:1000_{1\text{-}10}$)
- Recommend as upper range estimate
- VLYL of €50,000 (based on conversion of WTP $5:1000_{1\text{-}10}$; (5:1000 Δ in risk equates to Δ in LE of 40 days)) (See Rabl (2001) for method)
- Discount Rate of 6% approx (3 country average)

  (Implicit from WTP $5:1000_{1\text{-}10}$ and $5:1000_{70}$)

NEWEXT Results (cont.)

- WTP Regression results (5:1000 immediate)
  - no association between respondent age and WTP
  - Higher income associated with higher WTP
  - Hospitalisation for cardio- and respiratory illnesses in past 5 yrs associated with higher WTP
  - No association between WTP and cancer and chronic illnesses

Morbidity valuation

- Recent 5-country study (CSERGE, Navrud, 1999) has provided up-dated values for many end-points
- EC DG Research project (ExternE-Pol) looking to up-date value for e.g. Chronic Bronchitis since epidemiology does not match symptoms valued

Morbidity valuation – key values

Health end-point	**Recommended unit values** €
Respiratory hospital admissions 8 days hospitalisation: 14 days hospitalisation:	3,675 central value (2,380-4,970)*
Cardiac hospital admissions 8 days hospitalisation: 14 days hospitalisation:	2,764 (central)
A&E visits for respiratory illness	311
GP visits: Asthma Lower respiratory symptoms	 56 76
Respiratory symptoms in asthmatics: Adults Children	 146 294
Restricted activity days	139
Chronic bronchitis	Not valued

* Updated EAHEAP WTP+COI. Based on NHS savings of €2100 – 3,500 (1999/2000 prices) and WTP of €280 - €1190 (1999 prices).

Current ExternE position on valuation of premature death

- New values derived from risk change WTP questions to be used as starting point
- Rationale dependent on epidemiological measures
- VLYL to be used in conjunction to VSL depending on context

Noise Impacts – values for road traffic noise based on the Stated Preference studies

Study (Author, Year of Publication)	**Country**	**€/dB/hh/year (2001-€)**
Pommerehne 1988	Switzerland	99
Soguel 1994a	Switzerland	65,5
Sælensminde & Hammer 1994 / Sælensminde 1999	Norway	72
Wibe 1995	Sweden	28
Vainio 1995, 2001	Finland	7,5
Thune–Larsen 1995	Norway	19
Navrud 1997	Norway	2
Navrud 2000b	Norway	27,5
Arsenio et al 2002	Portugal	23,5
Barreiro et al 2000	Spain	2,5
Lambert et al 2001	France	7
Average		32.1
Median		**23,5**

Noise Impacts

- DG Environment of the European Commission now uses 23.5 euro/ dB/household/year as an interim value for road traffic noise in their Cost-Benefit analyses.
- For aircraft noise and rail noise there are too few stated preference studies to calculate interim values.

Health Impacts: Noise

Monetary valuation noise impacts	**€$_{2000}$**	**Unit**
Myocard infarction (fatal, 7 years of life lost)	96 500	per YOLL
Myocard infarction (non-fatal)	680	cost per cardiology-related inpatient day
Myocard infarction (non-fatal)	100	opportunity costs due to absenteeism from work per day
Myocard infarction	14 400	per case to avoid morbidity (disutility)
Angina pectoris	680	cost per cardiology-related inpatient day
Angina pectoris	100	opportunity costs due to absenteeism from work per day
Angina pectoris	230	per day to avoid morbidity (disutility)
Hypertension	350	per inpatient day
Sleep disturbance (COI)	220	per person per year
WTP for avoiding amenity losses	18	per dB over 55 dB per person per year

Planned New Empirical work: Health Valuation (reflecting remaining uncertainties)

- EC NEEDS Research project
  - Ask LE question directly
  - Experiment in survey with:
    - » context specification
    - » Payment vehicle
    - » Open-ended questions
  - Collect implicit valuations (e.g. resources spent on health care)
  - Further testing of transfer functions
- EC DG RTD Health valuation projects
  - Focus on valuation of impacts on children's health