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ECONOMIC ASSESSMENT OF ROAD SAFETY

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INTRODUCTION: ECONOMIC RESEARCH SWOV

- Social costs of road crashes
- Economic assessment of road safety measures
- Value of a statistical life
- Road safety expenditure
- International working groups



INTRODUCTION

- Why economic analysis of road safety?
 - Scarce resources vs. many investment options
 - Efficient use of resources in order to attain as much safety as possible
- PIARC TC 2 Working group on cost-effectiveness of road safety measures and allocation of resources
 - Literature review and questionnaire
 - State of the practice report



OUTLINE OF THIS PRESENTATION

- Introduction
- Working group activities and outputs
- Economic assessment tools
- Data requirements
- Monetary valuation of road safety
- Role of economic assessment in policy making
- Conclusions and recommendations



STATE OF THE PRACTICE REPORT: TOPICS

- Project appraisal
- Cost-effectiveness analysis (CEA)
- Cost-benefit analysis (CBA)
- Monetary valuation of road safety
- Data requirements for economic assessment of road safety
- Results of economic assessment studies
- Barriers to the use of economic assessment tools
- Resource allocation practices
- Case studies CEA and CBA



QUESTIONNAIRE

- Topics:
 - Use of economic assessment tools
 - Barriers for using these tools
 - Monetary values used
 - Secondary effects
 - Cost-effectiveness of road safety measures
 - Methodological aspects
- Response of 21 Countries
 - 10 European, 3 Asia, 3 Latin-America, 2 North-America, 1 Middle East, 1 Africa, Australia



ECONOMIC ASSESSMENT TOOLS

- Cost-effectiveness analysis
 - Costs vs. effects in terms of casualties saved
 - Appropriate when budgets are fixed and no side effects
- Cost-benefit analysis
 - Costs vs. benefits in terms of reduced road crash costs and side effects (travel time, environment)
 - Do benefits outweigh the costs?
 - Enables making comparisons with other investments
- Cost-utility analysis
 - Costs vs. effects in terms of QALYs (Quality Adjusted Life Years) saved
 - Takes into account effects on quality of life (life years lost, severity and duration of injuries)



EXAMPLE COST-BENEFIT ANALYSIS

	Package 'Optimal use of road safety measures'	Package 'Strengthening present policy'
Benefits:		
Road safety	10.042	8.471
Travel time	-816	1.591
Transport costs	184	-240
Environment	121	-17
Public health	66	80
Increase of mobility	8	70
<i>Total benefits</i>	<i>9.604</i>	<i>9.953</i>
Costs:		
	6.472	11.042
Efficiency:		
Benefit-cost balance	3.132	-1.088
Benefit-cost ratio	1,48	0,90

Costs and benefits of road safety measure packages in Norway (million Euro; source: Elvik, 2007)



DATA REQUIREMENTS CBA AND CEA

- Costs of road safety measures
 - No international standard methodology
 - Few (international) data available, country-specific studies needed
- Effects of road safety measures
 - Preferably before-after study and control group
 - Meta-analysis, e.g. Handbook of road safety measures (Elvik et al, 2009)
- Road safety future developments
 - Mobility
 - Risk
- Secondary effects
- Valuation of road crash costs
 - Needed to monetize road safety effects
 - International standards available (e.g. COST 313)



SOCIAL COST OF ROAD CRASHES

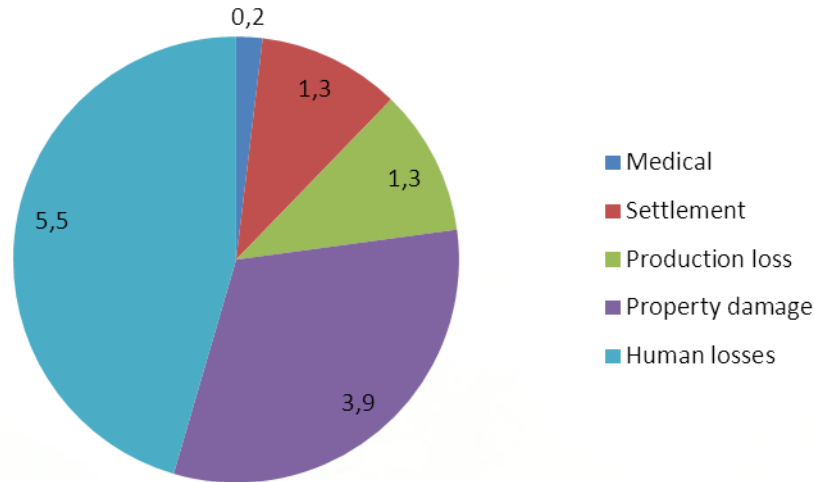
Cost elements:

- Medical costs
- Production loss
 - permanently (fatalities)
 - temporarily (injuries)
- Property damage (vehicles, roads, etc.)
- Settlements costs: police, fire service, judicial, insurance
- Human losses: loss of quality of life, grief, sorrow



SOCIAL COST OF ROAD CRASHES: EXAMPLE

Costs of road crashes in the Netherlands: 12 billion euro (2003)



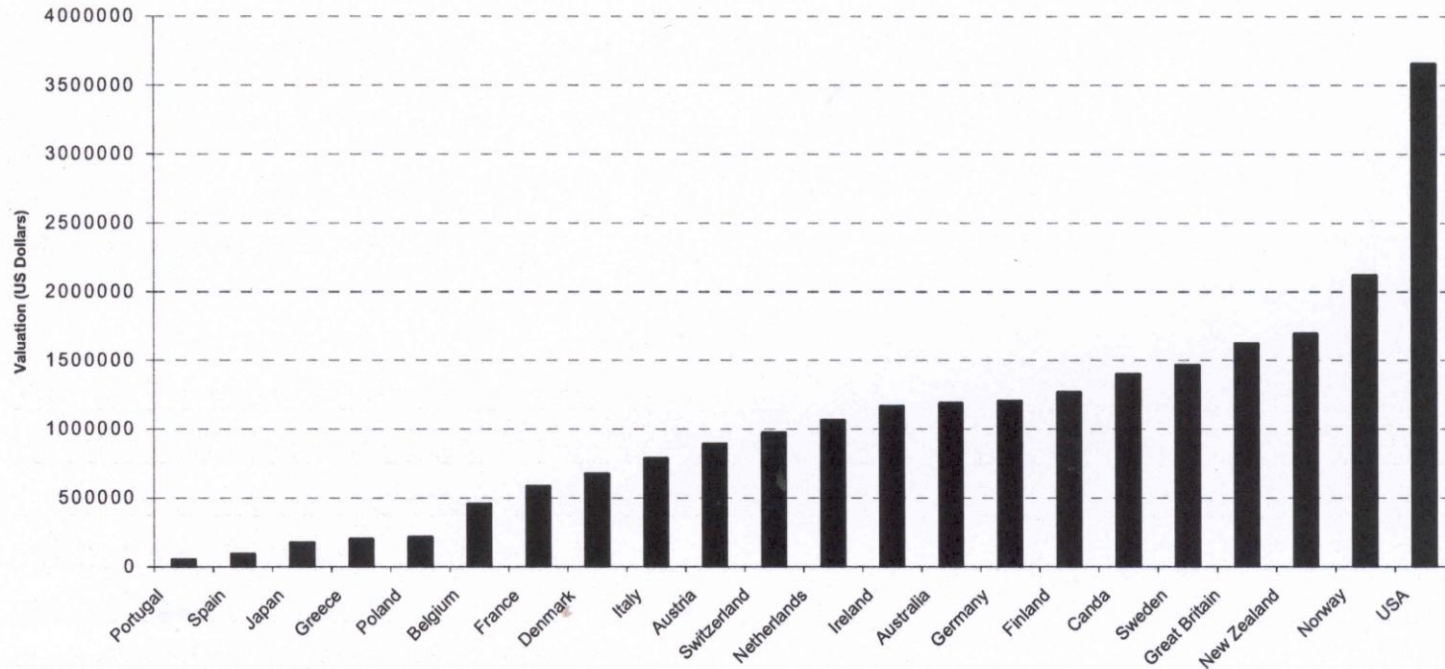
Compare costs of traffic jams: 2.5 billion euro

Costs per casualty:

- Fatality: 2.4 million euro
- Serious injury: 250.000 euro
- Accident & Emergency: 8.000 euro



VALUE PER FATALITY: INTERNATIONAL COMPARISON



Source: TØI report 634/2003

Figure S.1 Official valuations of a traffic fatality in various countries ranked in ascending order. Unit: purchasing-power-parity-adjusted 1999 USD.

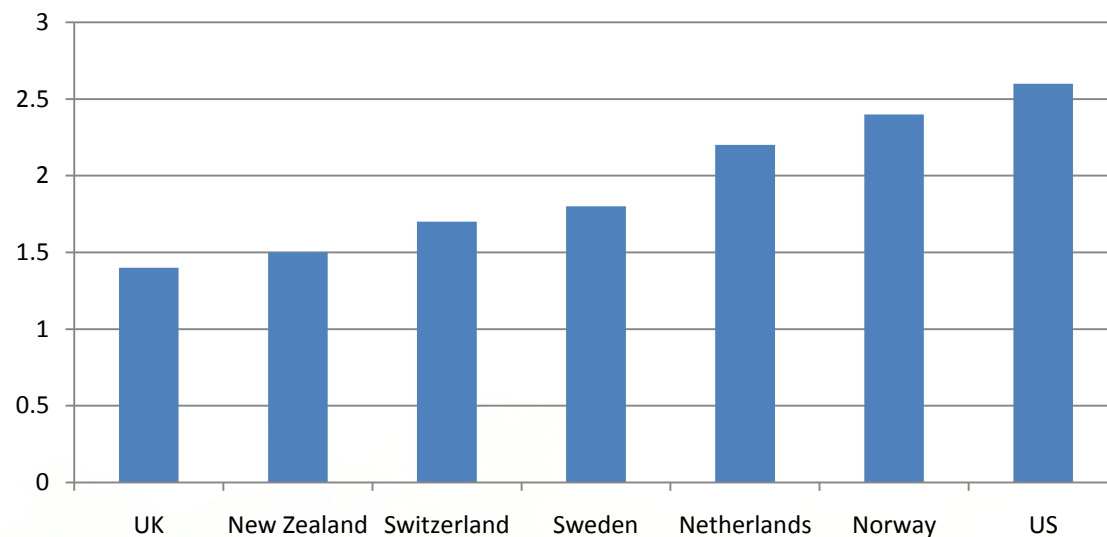


HUMAN COSTS

- Human costs: suffering, pain, loss of quality of life
- Concepts used:
 - Value of a Statistical Life (VOSL)
 - Willingness to pay for a risk reduction
- Methods:
 - Revealed preferences
 - Stated preferences
- Human costs of (serious) injuries
 - Cost per casualty relatively low (UK: 10% of VOSL)
 - Total costs are high because of large number of injuries



WTP VALUES: INTERNATIONAL COMPARISON



Value of a statistical life, million euro (source: De Blaeij et al., 2004)



TRANSFERRING VALUES BETWEEN COUNTRIES

- Ideally: country-specific values of a statistical life (VOSL), based on WTP
- Value transfers on the basis of income differences
 - Linear relation between GDP/capita and VOSL (income elasticity is 1)
- Estimates in literature: VOSL is 70-120 times GDP per capita



ECONOMIC ASSESSMENT AND POLICY MAKING

- CEA and CBA are decision *supporting* tools
- Barriers to the use of economic assessment tools (ROSEBUD):
 - Fundamental, theoretical basis
 - Institutional
 - Technical
 - Implementation
- How to overcome (technical) barriers?
 - Develop standard methodologies
 - Establish system for exchanging information
 - International scope



CONCLUSIONS AND RECOMMENDATIONS

- Economic assessment tools are useful to support decision making
- Road safety measures often found to be cost-beneficial
- Data requirements are high
- International scope is needed
 - Standard methodologies
 - Exchanging and transferring information
- Further methodological improvements:
 - Human costs of injuries
 - Quality adjusted life years

