The economics of road safety: investment pays


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Findings from road safety policy analyses

- Analyses of road safety policy have been made for:
  - Norway 1984
  - Norway 1999
  - Sweden 2000
  - Norway 2007

- All these analyses show that there is a great potential for improving road safety by means of cost-effective measures

- Current road safety policies do not fully employ all cost-effective road safety measures to the optimal extent
A maximally efficient use of road safety measures

- Each road safety measure is used optimally
- Optimal use is to apply a measure up to the point at which marginal benefits (i.e. the extra benefits contributed by a small increase in the use of a measure) equal marginal costs of using the measure
- Optimal use of road safety measures will maximise social benefits and yield the largest surplus of benefits over costs
- Benefits include all relevant impacts of measures on safety, mobility and environmental quality
Illustration of how optimal use of a road safety measure is determined - conversion to roundabouts

Optimal use = marginal benefits = marginal costs
Total benefits and costs of converting junctions to roundabouts

Total benefit = 4504
Marginal benefit = marginal cost
Total cost = 2419

Benefits (million NOK; 1 NOK = 0.125 Euro)
Costs (million NOK; 1 Nok = 0.125 Euro)
Annual average daily traffic (AADT)
Potential reduction of road accident fatalities by 1993 in Norway according to policy analysis in 1984

Baseline number of fatalities: 379
Expected in 1993 without new measures: 447
Expected in 1993 if current policy continues: 390
Expected in 1993 if measures are used optimally: 350
Potential reduction of road accident fatalities in Norway by 2012 according to policy analysis in 1999

Policy options

<table>
<thead>
<tr>
<th></th>
<th>Baseline number of fatalities</th>
<th>Expected in 2012 without new measures</th>
<th>Expected in 2012 if current policy continues</th>
<th>Expected in 2012 if measures are used optimally</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of fatalities</td>
<td>300</td>
<td>372</td>
<td>338</td>
<td>189</td>
</tr>
</tbody>
</table>

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Potential reduction of road accident fatalities in Sweden by 2012 according to policy analysis in 2000

Baseline number of fatalities: 554
Expected in 2012 without new measures: 613
Expected in 2012 if current policy continues: 528
Expected in 2012 if measures are used optimally: 316
Potential reduction of road accident fatalities in Norway by 2020 according to policy analysis in 2007

Baseline number of fatalities | Expected in 2020 without new measures | Expected in 2020 if current policy continues | Expected in 2020 if measures are used optimally
--- | --- | --- | ---
250 | 285 | 190 | 138
Some preliminary observations

- Road safety can be greatly improved by using road safety measures optimally
- Current road safety policies do not use all road safety measures optimally
- The potential for reducing the number of fatalities does not appear to have been reduced over time
- Which are the road safety measures that can contribute the most to reducing fatalities and how realistic is it to apply these measures optimally?
Contributions of various types of road safety measures to reducing road accident fatalities in Norway if used optimally

Main categories of road safety measures

Road investments  Traffic control  Vehicle safety features  Police enforcement  Legislation and training

Contribution to reducing fatalities

- Road investments: 44, 16, 23
- Traffic control: 33, 4, 3
- Vehicle safety features: 91
- Police enforcement: 41, 72
- Legislation and training: 3, 4, 6
International cooperation is needed

- An increasing proportion of the potential for improving road safety is attributable to vehicle safety features.

- Some promising new safety features include:
  - ISA (intelligent speed adaptation)
  - Accident data recorder
  - Enhanced neck injury protection in rear impacts
  - Electronic stability control

- To make new safety features mandatory on all new cars, international agreement is needed, as the market for cars is global and safety standards should be the same in all countries.
Costs of road accidents as percentage of gross domestic product

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>Austria</td>
<td>4.3</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>0.5</td>
</tr>
<tr>
<td>Canada</td>
<td>4.9</td>
</tr>
<tr>
<td>Denmark</td>
<td>1.3</td>
</tr>
<tr>
<td>Finland</td>
<td>1.9</td>
</tr>
<tr>
<td>Germany</td>
<td>1.3</td>
</tr>
<tr>
<td>Great Britain</td>
<td>1.7</td>
</tr>
<tr>
<td>Greece</td>
<td>2.0</td>
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<tr>
<td>Italy</td>
<td>3.2</td>
</tr>
<tr>
<td>Korea</td>
<td>2.6</td>
</tr>
<tr>
<td>Netherlands</td>
<td>2.5</td>
</tr>
<tr>
<td>New Zealand</td>
<td>2.4</td>
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<tr>
<td>Norway</td>
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</tr>
<tr>
<td>Sweden</td>
<td>2.0</td>
</tr>
<tr>
<td>United States</td>
<td>2.3</td>
</tr>
</tbody>
</table>
How much to invest in road safety - illustration for Norway

Cost of accidents: 31.9 billion NOK
Cost of safety measures: 7.9 billion NOK
Benefits of safety measures (5%): 23.6 billion NOK
Benefits of safety measures (2%): 9.5 billion NOK

31.9 \times 0.05 \times 14.828
Concluding remarks

- Cost-effective road safety measures can greatly improve road safety – even in comparatively safe countries like Norway and Sweden.
- The potential for cost-effective improvements of road safety has not become smaller over time.
- An increasing share of the potential for cost-effective improvements of road safety is attributable to vehicle safety features.
- To harvest the benefits of these safety features, international cooperation and a common understanding of road safety problems is needed.
Concluding remarks, continued

- Road accidents cost up to 5% of the gross domestic product – in many countries costs are around 2-3% of GDP.
- The amounts invested in road safety are likely to be smaller than the costs of accidents, although very few estimates of this are available.
- How much it pays to invest in road safety, depends on the cost-effectiveness of the investments.
- For Norway, current spending is cost-effective even if it reduces the annual cost of accidents by as little as 2% - provided this reduction lasts for 25 years.