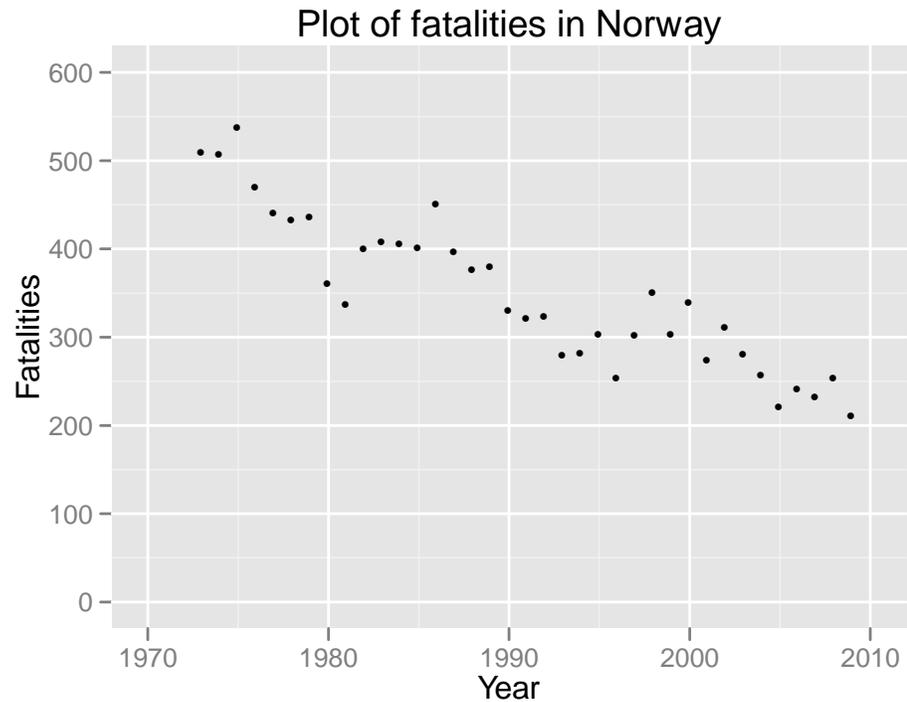


Norway

Fatalities

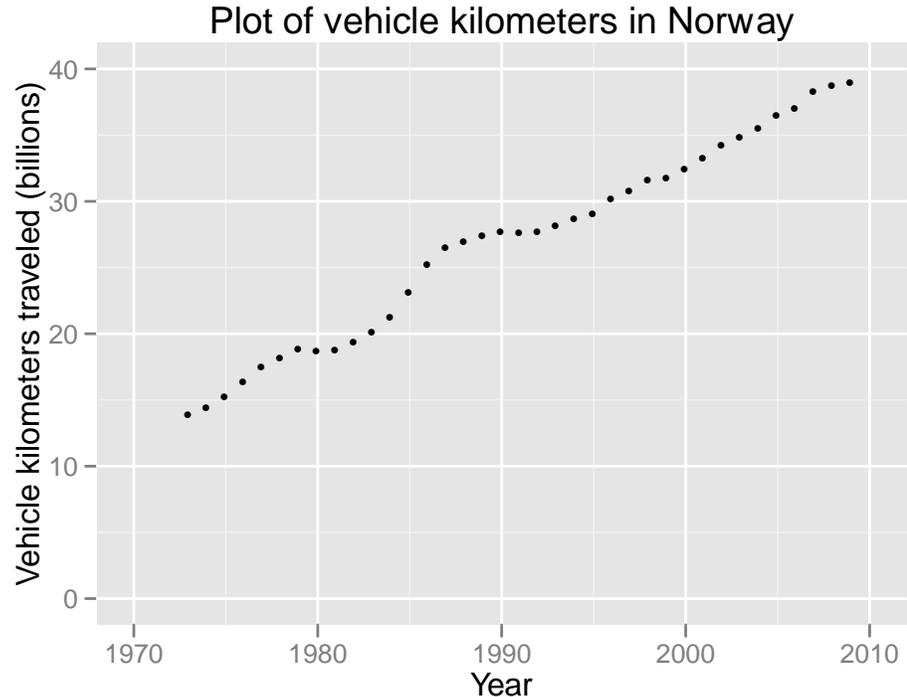


- The fatalities have dropped from more than 500 in 1973 to 212 in 2009. Between 1973 and 1990 the annual decrease ranged between zero and more than 3%, while after 1990 it has increased and has been more consistently around 2.5%.
- An overall consistent decreasing trend can be identified when looking at the time-series as a single line. It is also possible to identify three sub-sections with a steeper decreasing slope (1973-1981, 1986-1996 and 1998-2009), connected by short periods of increasing number of fatalities.



Road Safety Development - Norway

Traffic Volume



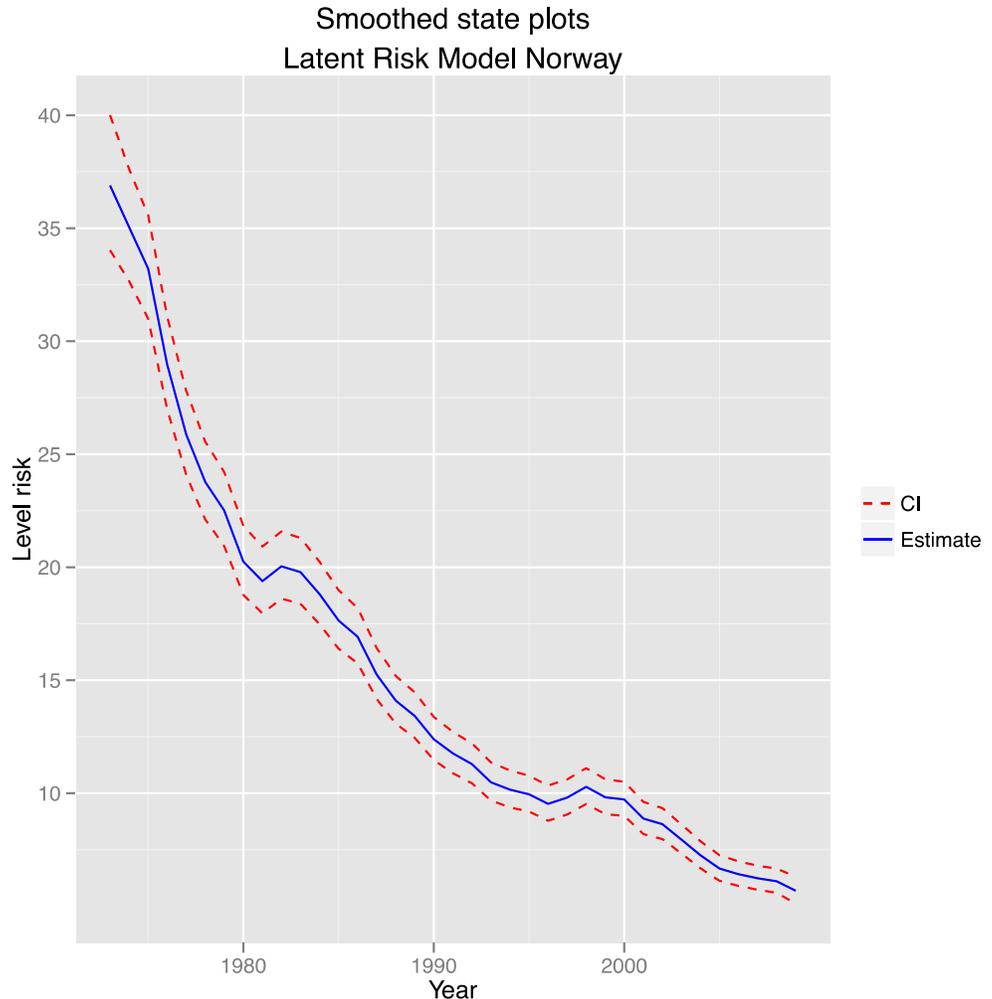
- The number of fatalities depends strongly on the amount of traffic. To forecast the fatalities, the traffic volume (measured in vehicle kilometres) has to be forecasted first.
- The selected measure for traffic volume is the vehicle kilometres (in billions) per annum, which are considered from 1973 onwards.
- Development:
 - o In the seventies and eighties the year-to-year change ranged between a 7-8% increase and marginal decreases.
 - o Since then, however, an average annual increase of about 2% has been observed (albeit with significant variability between 0 and 3-4%).
 - o



Road Safety Development - Norway

Fatality Risk

- The fatality risk is the number of fatalities per billion (10^9) vehicle kilometres.
- Estimation model – technical definition: Latent Risk fixed risk slope (Bijleveld at al., 2010)
- CI: 68% confidence interval



The fatality risk has been decreasing by about 5% annually

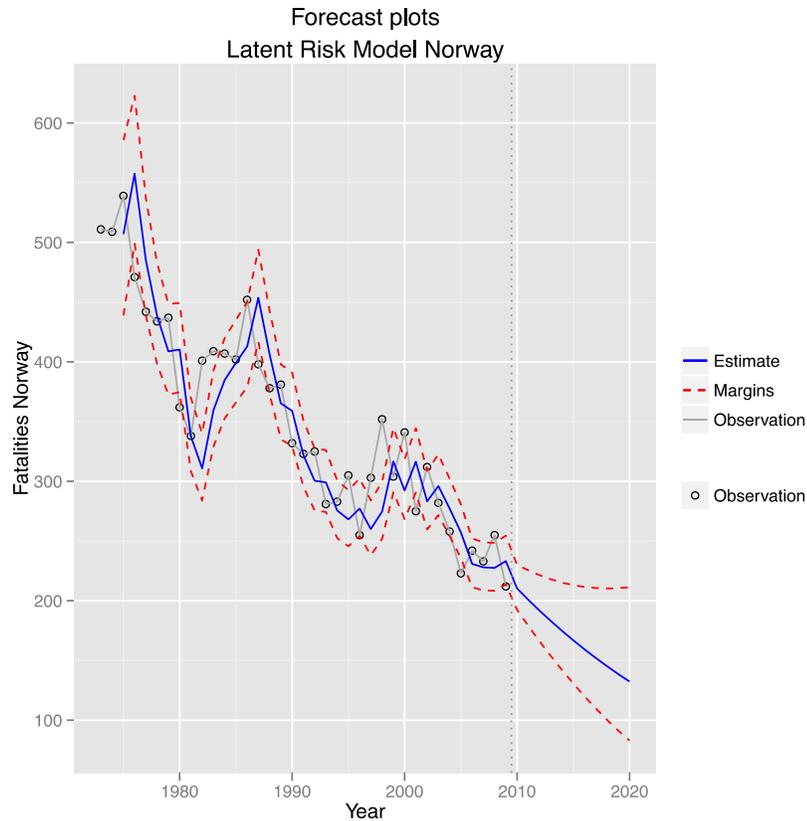
- The risk for fatalities has been reduced in Norway from more than 37 per billion vehicle kilometres in the early 70s to about 5 per billion vehicle kilometres in the most recent years.
- This corresponds to a decrease of about 5% on average annually.



Road Safety Development - Norway

Forecasts to 2020

- If road safety is improved at the same rate as previously and the past development of mobility continues, the following forecasts can be made for the number of fatalities in 2020:



If RS efforts continue at the same level, the expected number of fatalities in 2020 is 132.

Forecast of road-traffic fatalities in Norway up to 2020

Year	Prediction	Lower CI	Upper CI
2010	210	177	251
2011	201	160	252
2012	192	144	255
2013	183	130	258
2014	175	116	263
2015	167	103	270
2016	159	91	279
2017	152	80	289
2018	145	70	301
2019	139	61	316
2020	132	53	333

Disclaimer

- Statistical forecasting does not offer a definite prediction of what is *actually* going to happen in the future.
- The estimates are based on the “business as usual” assumption: no *principal* changes between past and future development.
- Even in these conditions future outcomes are uncertain. This uncertainty is represented in the confidence intervals (plotted in the red margins: 68%; printed in table: 95%).

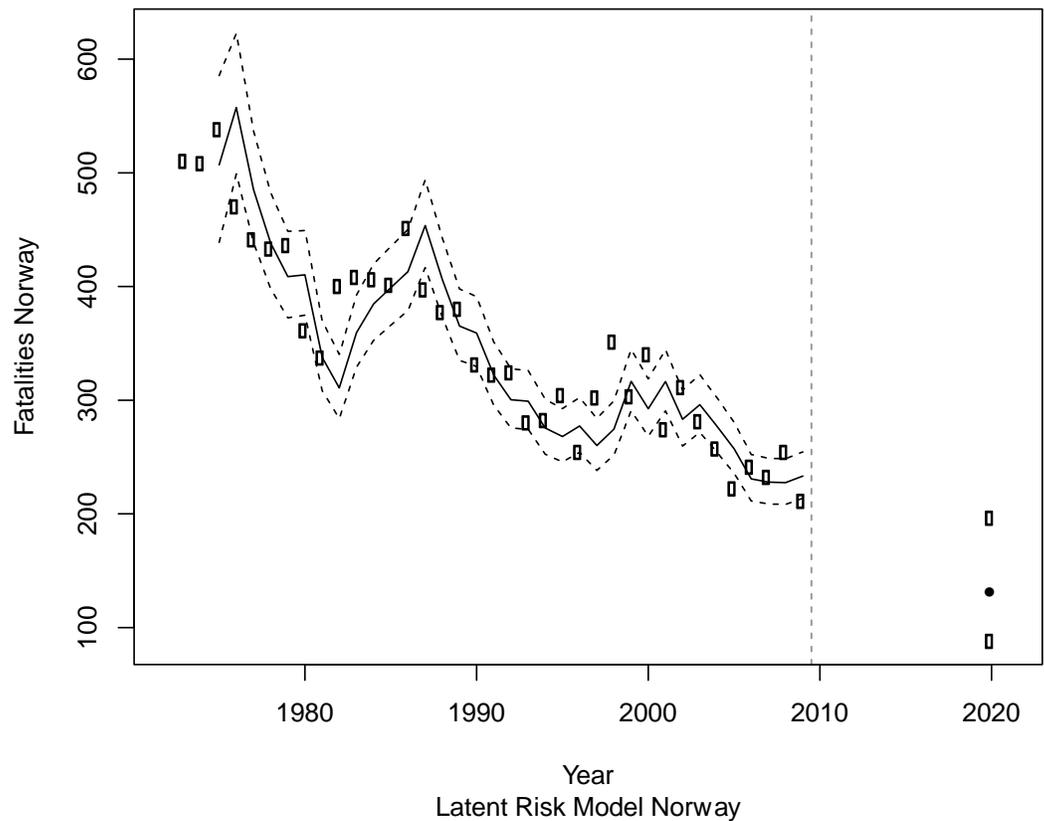


Road Safety Development - Norway

Scenarios

- The strong uncertainty about the development of the fatalities in Norway is for a good part due the development in traffic volume.
- To illustrate that, three point-estimates for fatalities in Norway for 2020 are plotted assuming three different scenarios for traffic volume.
 - o Reference: stagnation (forecasted value)
 - o Scenario 1: increase (forecast plus one standard deviation)
 - o Scenario 2: decrease (forecast minus one standard deviation)

Forecastplot



Scenarios for Traffic Volume

	<i>Vehicle kilometres (billions)</i>	<i>Road traffic fatalities</i>
<i>Situation 2009:</i>	39	212
<i>Prediction 2020 according to mobility scenarios:</i>		
- Stagnation	41	131
- Increase	61	196
- Decrease	28	89



References

- [1] EC National Expert for road accident statistics and road safety performance indicators.
- [2] Dupont & Martensen (Eds.) 2012. Forecasting road traffic fatalities in European countries. Deliverable 4.4 of the EC FP7 project DaCoTA.
- [3] Bijleveld F., Commandeur J., Gould P., Koopman S. J. (2008),. Model-based measurement of latent risk in time series with applications. Journal of the Royal Statistical Society, Series A, 2008.
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- [5] Commandeur, J. & Koopman, S.J. (2007) An Introduction to State Space Time Series Analysis. Oxford University Press.

