# Switzerland

## Fatalities



Plot of fatalities in Switzerland
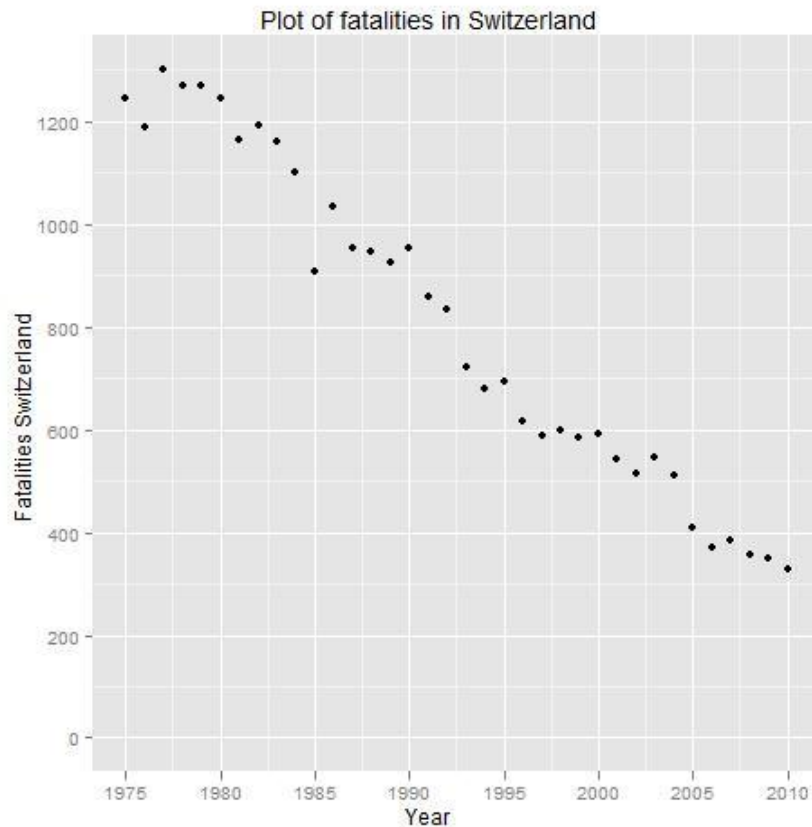
- The fatality figures present a constantly decreasing trend throughout the period 1975 - 2010, with three small yet visible drops in 1976, 1985 and 2004, and a visible small rise in 1990.

**Registration of fatalities**
- The 30-days definition for fatalities is used throughout the series
- The drop in 1985 is the most striking one, however according to national sources no intervention was involved, such as a change in registration, introduction of measures or other socioeconomic event. It was decided to treat this value in the fatality series as an outlier.

**T r a n s p o r t**

## Traffic Volume

Plot of Vehicle Kilometres (per million) in Switzerland
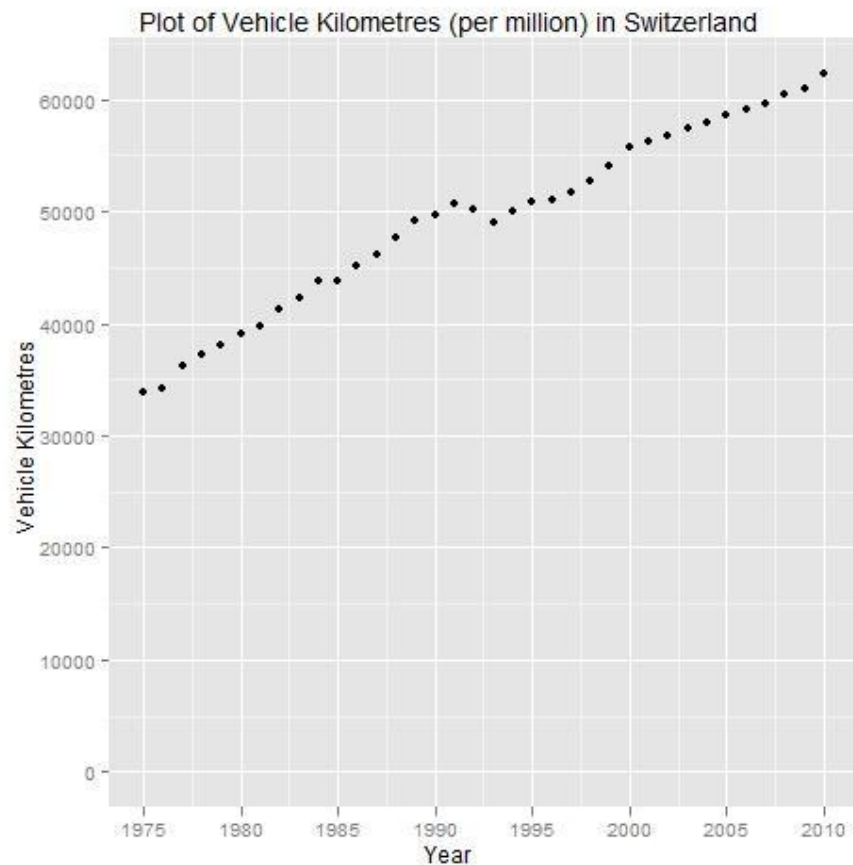


- The number of fatalities depends strongly on the amount of traffic. To forecast the fatalities, the traffic volume (measured in vehicle kilometres) has to be forecasted first.
- The selected measure for traffic volume is the vehicle kilometres (per million) per annum, which are considered from 1970 onwards.
- Development:
  o Between 1975 and 2010 the vehicle kilometres in Switzerland presents a constantly increasing trend, interrupted by a small drop in 1993.
  o The mobility in that country does not appear to be affected by the global recession.

## Fatality Risk

- The fatality risk is the number of fatalities per billion ($10^9$) vehicle kilometres.
- Estimation model – technical definition: Latent Risk fixed level exposure & fixed slope risk [2,1]
- CI: 68% confidence interval

**The drop in the mobility series observed in 1993 is also visible in the risk level**

Smoothed state plots
Latent Risk Model Switzerland
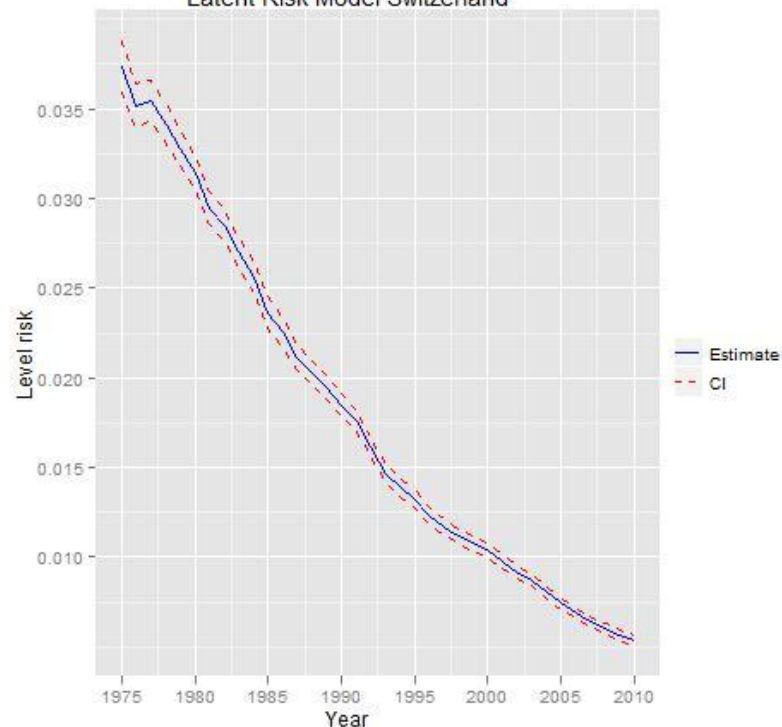


- The level for the risk (i.e., the fatalities per million vehicle kilometres) decreases smoothly over the examined period.
- A somewhat steeper drop of the risk is observed in 1993, a year in which a decrease in mobility took place.
- It was found that an intervention variable (change in exposure level in 1993) is highly significant
- The risk has decreased from more than 35 fatalities per billion vehicle-kilometres to around 5, with an average yearly decrease of 5.2%.
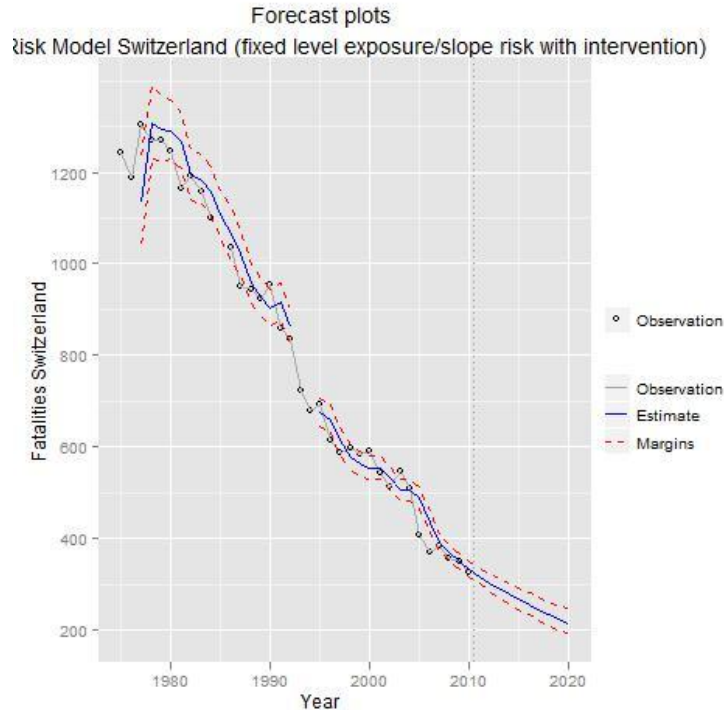
**Transport**

## Forecasts to 2020

If RS efforts continue at the same level, the expected number of fatalities in 2020 is 216.

− 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:



Forecast plots
Risk Model Switzerland (fixed level exposure/slope risk with intervention)

**Forecast of road-traffic fatalities in Switzerland up to 2020**

| Year | Prediction | Lower CI | Upper CI |
|------|-----------|----------|----------|
| 2011 | **317** | 288 | 350 |
| 2012 | **304** | 271 | 342 |
| 2013 | **291** | 255 | 333 |
| 2014 | **279** | 240 | 324 |
| 2015 | **267** | 226 | 316 |
| 2016 | **256** | 213 | 308 |
| 2017 | **245** | 201 | 300 |
| 2018 | **235** | 189 | 292 |
| 2019 | **225** | 178 | 285 |
| 2020 | **216** | 167 | 278 |

**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%).

**DaCoTA**

# Road Safety Development - Switzerland

## Scenarios

– Three point-estimates for fatalities in Switzerland 2020 are plotted assuming three different scenarios for traffic volume.

### Forecastplot



Latent Risk Model Switzerland (fixed level exposure/slope risk with intervention)
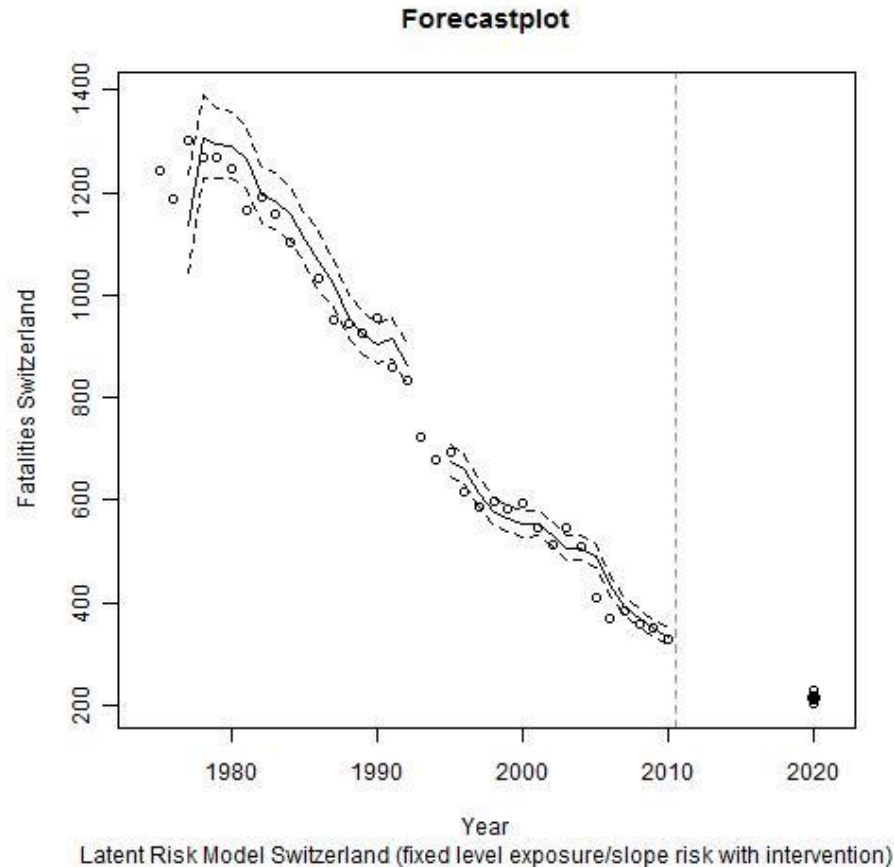
**Scenarios for Traffic Volume**
– Reference: continuation of development: increase of vehicle kilometres (forecasted value)
– Scenario 1: strong growth (forecasted value plus one standard deviation)
– Scenario 2: stagnation (forecasted value minus one standard deviation)

|  | Vehicle kilometers (billions) | Road traffic fatalities |
|---|---|---|
| *Situation 2010* | 62.3 | 327 |
|  |  |  |
| *Prediction 2020 according to mobility scenarios:* |  |  |
| Continuation of development | 70.3 | 216 |
| Stronger growth | 74.9 | 230 |
| Stagnation | 65.9 | 202 |

## 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.

[4] Martensen & Dupont (Eds.) 2010. Forecasting road traffic fatalities in European countries: model and first results. Deliverable 4.2 of the EC FP7 project DaCoTA.

[5] Commandeur, J. & Koopman, S.J. (2007) An Introduction to State Space Time Series Analysis. Oxford University Press.