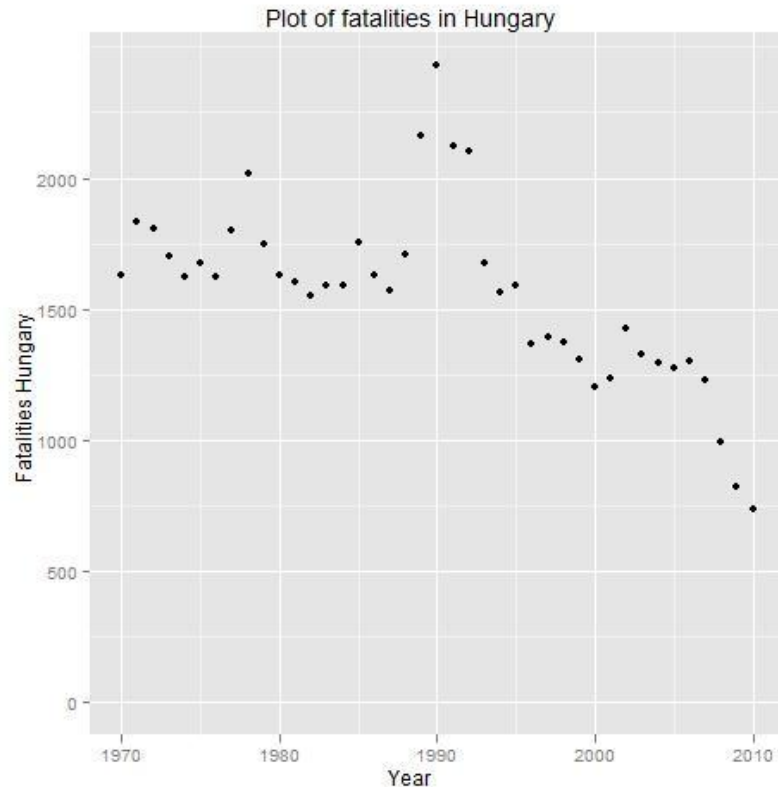


Hungary

Fatalities



- The fatality figures present considerable fluctuation from 1970 to 1990, with two visible peaks in 1971 and 1978, and a striking one in 1990. From 1990 onwards, an overall decrease is observed – despite a small rise on 2002 - which appears to be more intense after 2008.

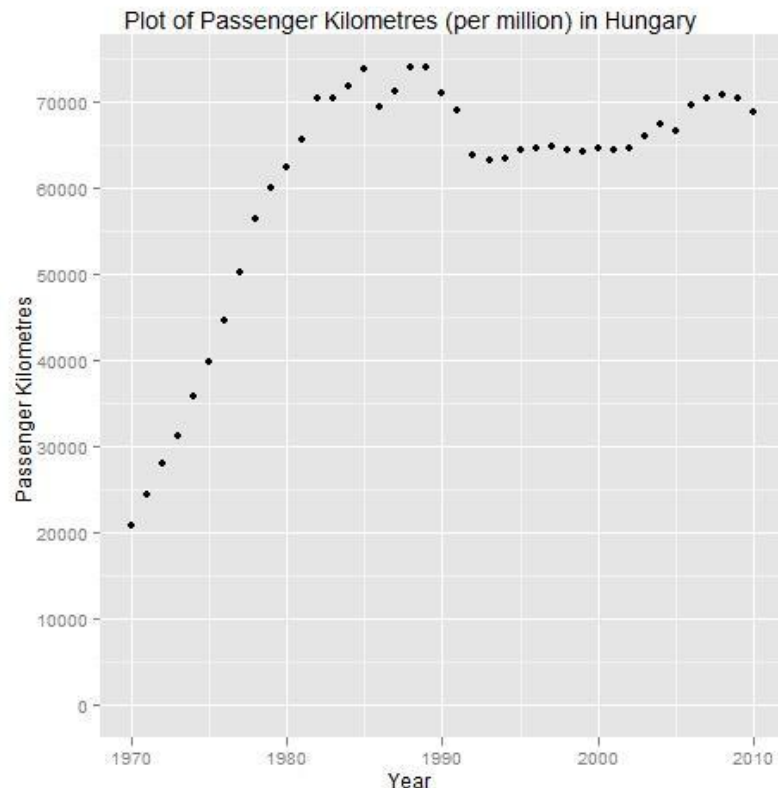
Registration of fatalities

- The 30-days definition for fatalities was adopted in 1978
- The following is known about road safety programmes or measures, changes in the data recording or other socioeconomic events in the country:
 - o A significant increase in the man-power of the Police took place in 1979
 - o The change of regime in 1990 may have affected mobility and road safety behaviours
 - o In 2002, an increase of motorway length by 19% took place.
 - o In 2008, a large set of road safety measures was introduced.



Road Safety Development - Hungary

Traffic Volume



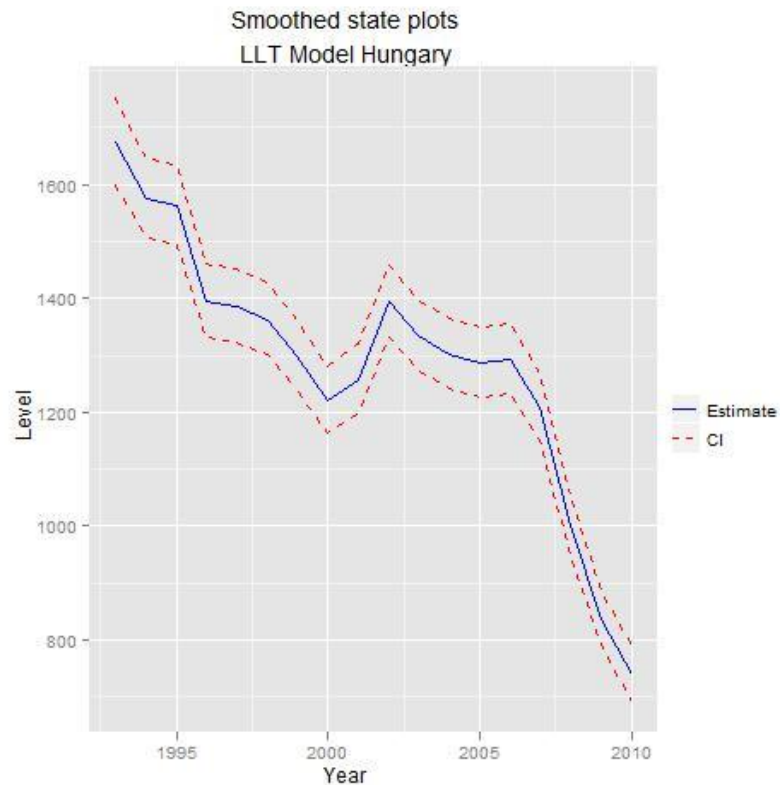
- The available exposure measure is the passenger kilometres (in millions) per annum, which are considered from 1970 onwards.
- Development:
 - o Between 1970 and 1989 the passenger kilometres in Hungary show a sharp constantly increasing trend.
 - o A decrease was observed between 1989-1993, followed by a flat trend until 2002.
 - o From 2002 the exposure rose again, but a decreasing trend started in 2008.
- Measurement:
 - o The seemingly linear increase of passenger-kilometres between 1970-1980 was examined more thoroughly, in order to assess whether this data may be an interpolation, which was not found to be the case.
- Before 1990, although the exposure rose impressively, the fatalities presented a relatively flat trend, with several bigger or smaller peaks. Moreover, the change of political regime in the early nineties is associated with an impressive peak in fatalities, and – rather surprisingly – a drop in exposure.
- The relationship between exposure and fatalities appears to differ significantly in different parts of the series, making it difficult to model the whole series. It was therefore decided to disregard the pre-1993 parts of both series and focus on the period 1993-2010 for forecasting.



Road Safety Development - Hungary

Fatality Trend

- The number of fatalities was examined for the period 1993-2010.
- Estimation model – technical definition: Local linear trend model with interventions [2,5]
- CI: 68% confidence interval



Fatalities have decreased from 1678 on 1993 to 740 fatalities on 2010. A visible peak in the series is observed on 2002, and a drop on 2008.

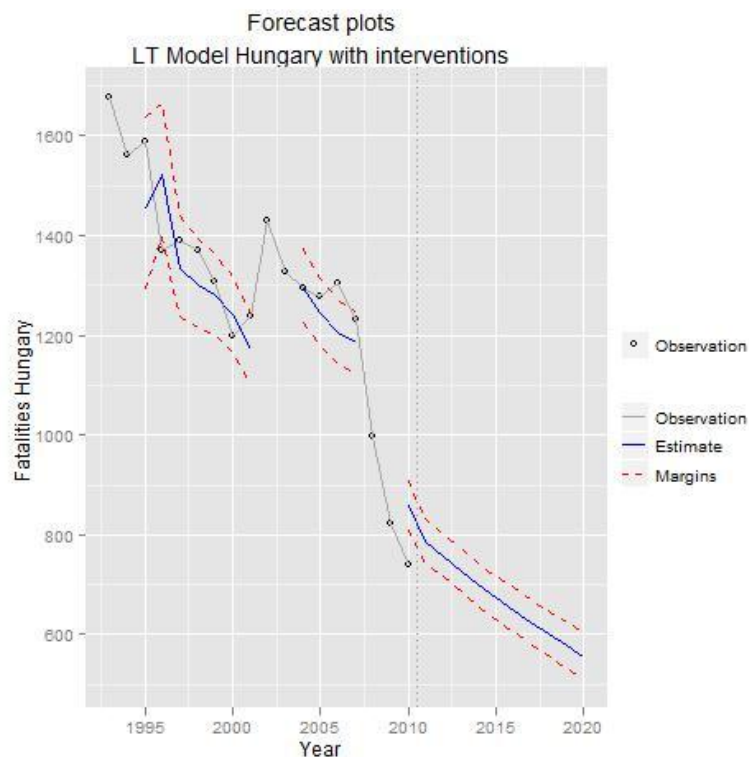
- No statistically significant relationship between exposure and fatalities was found for the examined period.
- The level for the fatalities has decreased from 1678 fatalities on 1993 to 740 fatalities in 2010. A visible peak in the fatality series is observed on 2002, and a drop is also observed in 2008.
- Two intervention variables were introduced in the model, one in 2002 (increase) and one in 2008 (decrease) on the level of fatalities.
- Overall, the fatalities have decreased on average by 4% yearly in the examined period. The average yearly reduction of the period 1993-2001 was 3.5%, an increase of 15% took place on 2002, the average yearly reduction of the period 2003-2007 was 2.8% and an average yearly reduction of 18% took place on 2008 and 2009.



Road Safety Development - Hungary

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 555.

Forecast of road-traffic fatalities in Hungary up to 2020

Year	Prediction	Lower CI	Upper CI
2011	787	706	876
2012	757	677	846
2013	728	649	817
2014	700	621	789
2015	674	594	764
2016	648	568	740
2017	624	543	717
2018	600	518	695
2019	577	494	674
2020	555	472	653

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%).



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.

