Spain (ES)

Fatalities

Plot of fatalities in Spain
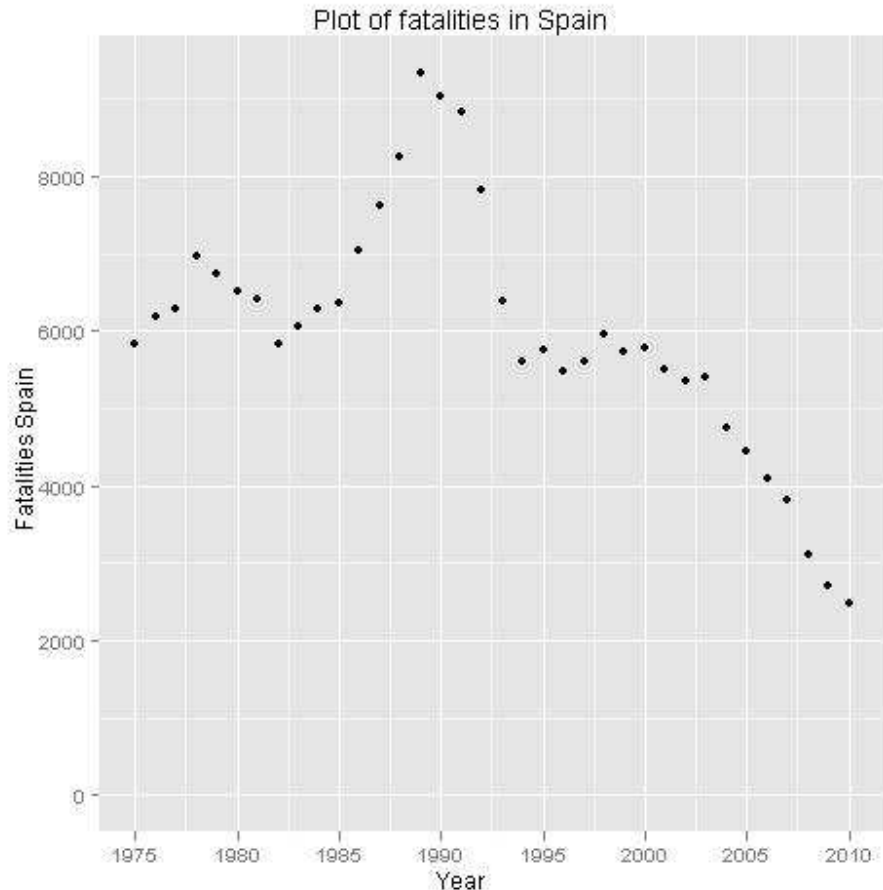

- Generally speaking, annual fatality numbers are characterized by important variation in Spain. However, it is clear that these number have been increasing up to 1990 (although with short periods of decrease), and have been decreasing thereafter (although with some periods of stagnation).
- The number of fatalities observed in 2010 (2,478) is almost 4 times lower than in 1989 (9,344).

Registration of fatalities

The registration of the Spanish traffic fatalities is based upon forms filled in by the police. There have been changes in the registration method in the period of study: In 1993, the 30-days criterion has been adopted to define fatalities at 30 days. However, However, given that fatalities at 30 days are estimated by correction factors, which have been applied retrospectively to the whole series, it is unlikely that the series at hand could have been affected by this registration change.

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Traffic Volume

Plot of Vehicle Kilometers in Spain
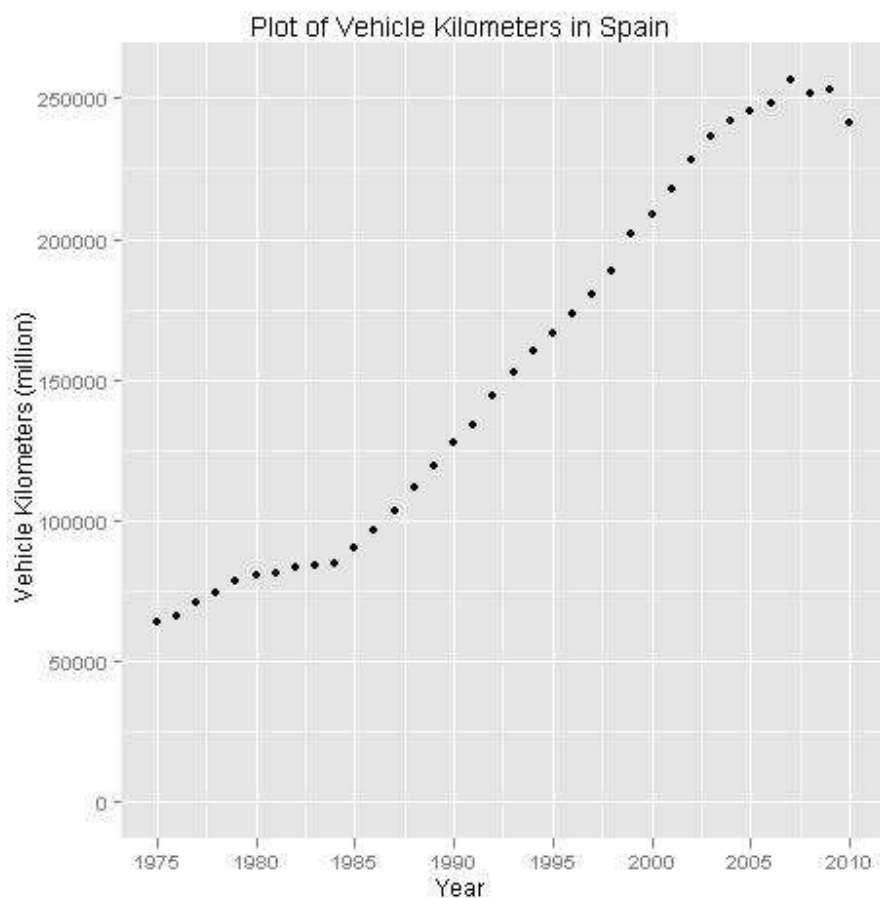
The vehicle kms are based on non-urban trips only.

- The number of fatalities depends strongly on the amount of traffic (exposure). To forecast the fatalities, the development of exposure has to be forecasted first.
- The selected measure is the number of vehicle kilometres, which is estimated and includes only non-urban trips. The quality of estimates is unknown. From 1994 there is a change in the calculation method, but it does not seem to have caused any break in the series.
- Overall, vehicle kilometres in the Spain increased from 1975 to 2007 but have started to fall in recent years.

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Fatality Risk

- The fatality risk is the number of fatalities per billion vehicle kilometres.
- Estimation model – technical definition: Latent Risk with interventions in slope fatalities & exposure (1991-92 and 2008-2011) (Bijleveld at al., 2008).
- CI: 95% confidence interval

Smoothed state plots
LRT slope risk and level exposure fixed MODEL. Spain 1975-2010
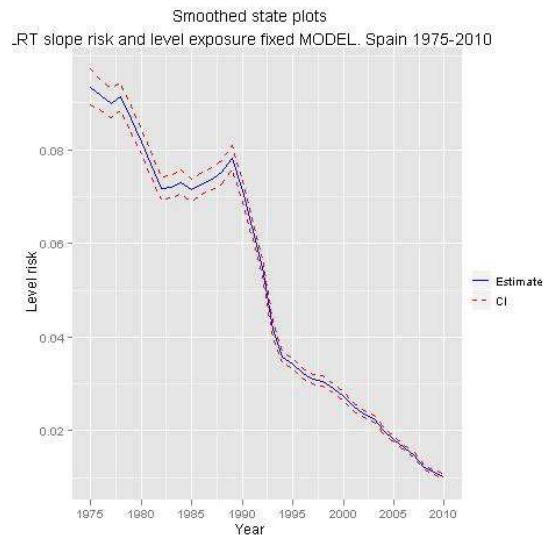
The fatality risk has been decreasing

- 1975-1981: number of fatalities increased but even stronger increase in traffic volume. -> risk reduction around 3.5% yearly.
- 1982-1988: increase in traffic volume has been proportionately less than the increase in the number of deaths -> increased risk around 1.5% yearly. This period coincides with the country's economic expansion from 1984.
- 1989-1993: sharp decrease in the number of fatalities even though the traffic volume continued to rise despite the onset of the crisis of 1990. -> strong risk reduction around 15% yearly.
- 1994-2003: stagnating number of fatalities even though traffic volume continues rising. -> risk reduction around 5% yearly. Coincides with the beginning of a new situation of economical expansion.
- 2004-2010: sharp decrease in the number of deaths and a slowdown in the traffic volume -> marked risk reduction around 10% yearly. Road safety is incorporated into the political agenda as a priority.

Forecasts to 2020

If the change in slope seen in 2008-2010 returns to the trend seen prior to 2008 in 2012, the following forecasts can be made for the number of fatalities in 2020:

Forecast plots
RT slope risk and level exposure fixed MODEL. Spain 1975-2010
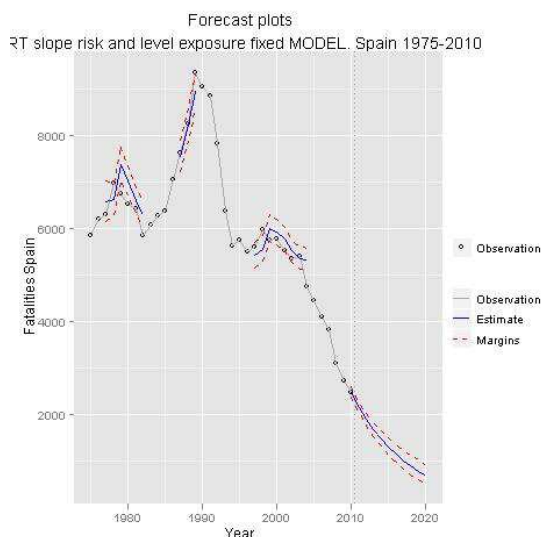
If road-safety returns to the trend seen prior to 2008 by 2012, the expected number of fatalities in 2020 is 692

Forecast of road-traffic fatalities in Spain up to 2020

Year	Prediction	Lower CI	Upper CI
2011	2,154	1,961	2,366
2012	1,899	1,658	2,174
2013	1,674	1,398	2,003
2014	1,475	1,176	1,851
2015	1,300	986	1,715
2016	1,146	824	1,594
2017	1,010	687	1,486
2018	891	571	1,389
2019	785	474	1,301
2020	692	392	1,222

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: 65%; printed in table: 95%).

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Scenarios

- The strong uncertainty about the development of the fatalities in the Spain is due to the development in traffic volume.
- The forecast estimates 692 fatalities in 2020. This could vary from 1,222 to 392 depending on the development of mobility scenarios.
- To illustrate the uncertainty of the traffic volume, three point-estimates for fatalities in Spain 2020 are plotted assuming three different scenarios for traffic volume.
  - Reference: moderate reduction of vehicle kilometres (forecasted value)
  - Scenario 1: weak reduction (forecast plus 1 stand.dev.)
  - Scenario 2: strong reduction (forecast minus 1 stand.dev.)

Forecast plots
RT Level Risk and Exposure Fixed Model. Spain 1961-2009
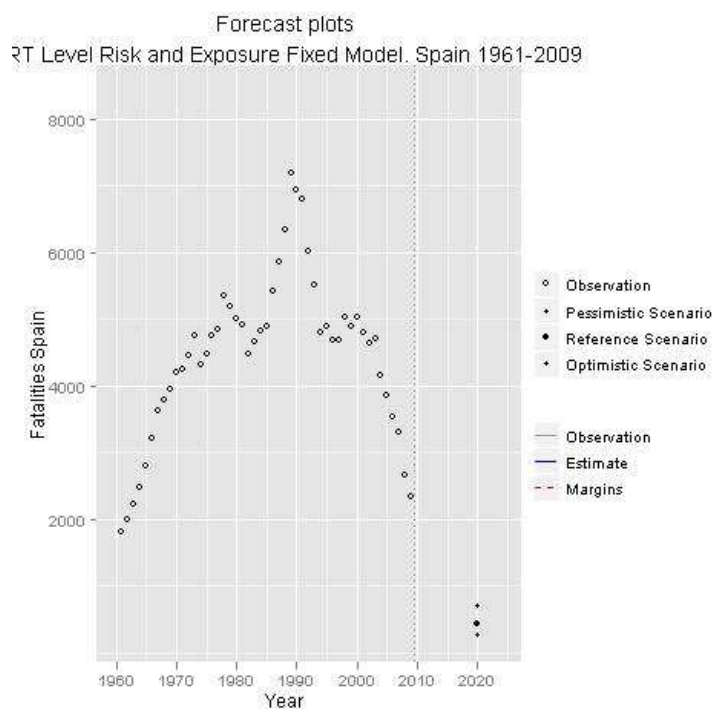
Scenarios for Traffic Volume

	Vehicle kilometers (billions)	Road traffic fatalities
Situation 2010:	241.1	2,478
Prediction 2020 according to mobility scenarios:		
- Moderate reduction	178.2	692
- Weak reduction	220.9	847
- Strong reduction	143.7	566

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.