Road Safety Development

Portugal (PT)

Fatalities

Plot of fatalities in Portugal
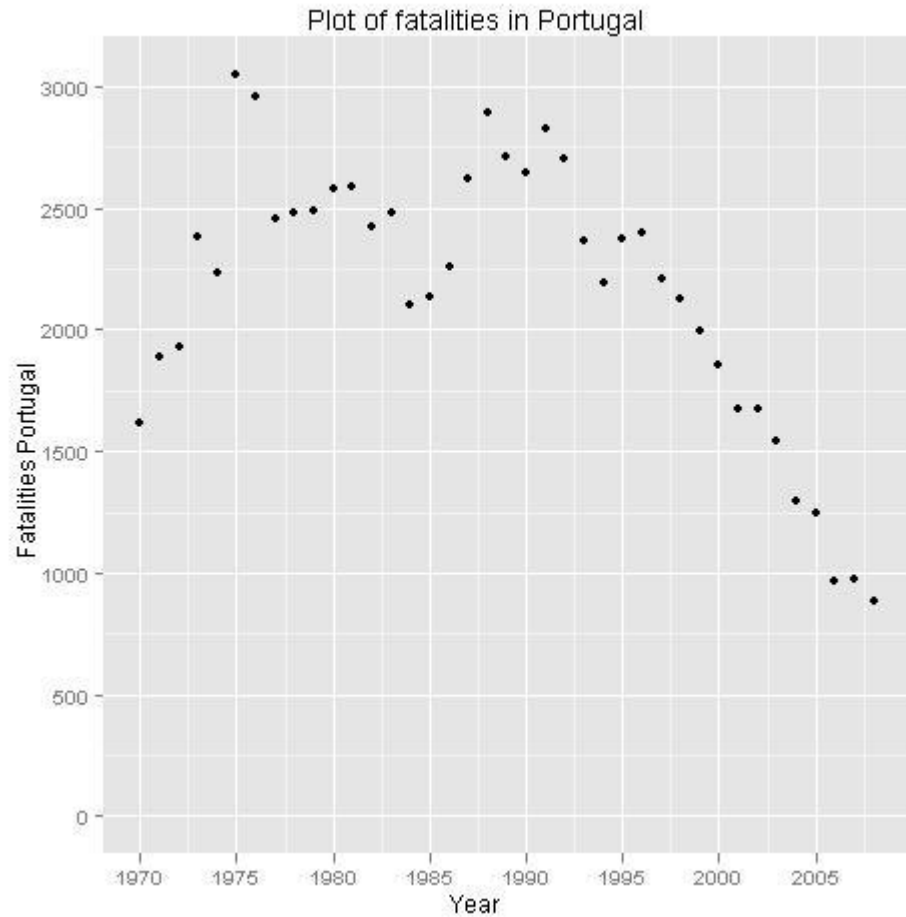
- There is a high variability in the annual number of Portuguese fatalities between 1970 and 2008. There is an initial period with a strong increase, then a period with a high variability and finally a period of strong decrease.
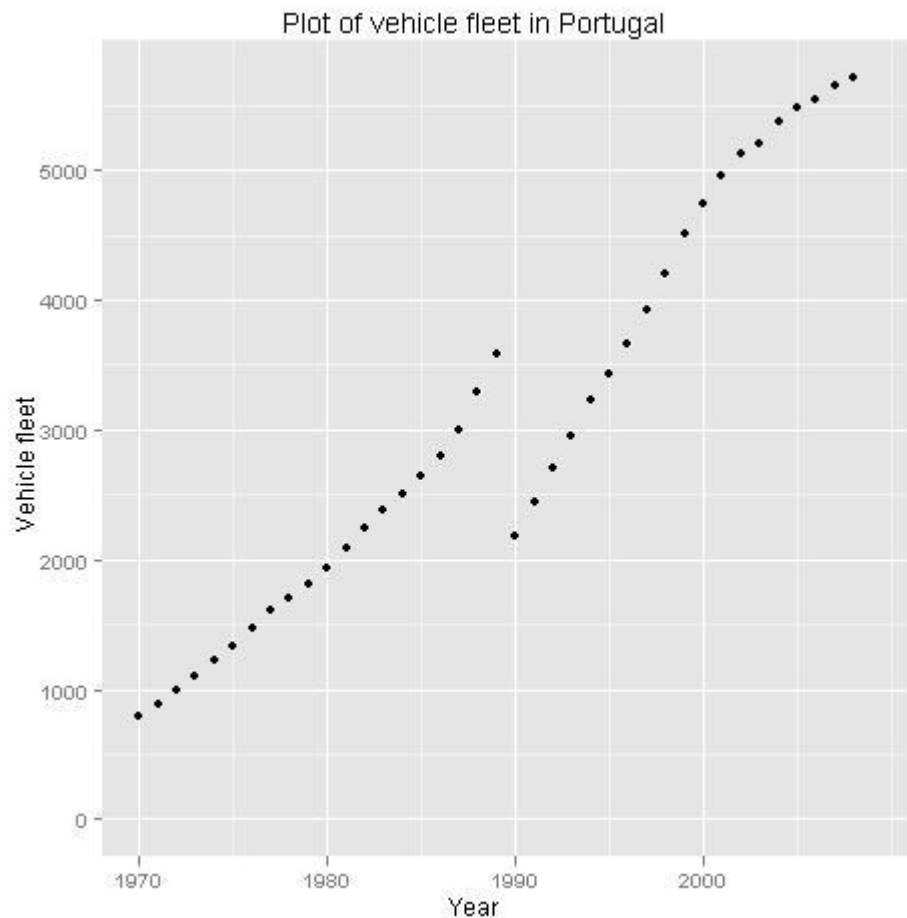- The number of fatalities observed in 2008 (885) is 3 times lower than in 1986 (2,889).

Registration of fatalities
- The road traffic data are based on police registrations by means of a standard form. Only accidents which are reported to the police authorities are covered.
- Before 2010: the data contained persons only who died at the scene or while being carried to hospital. A correction factor is applied to match killed at 30 days.
- Since 2010: Adoption of killed within 30 days after the accident as criterion.

Traffic Volume

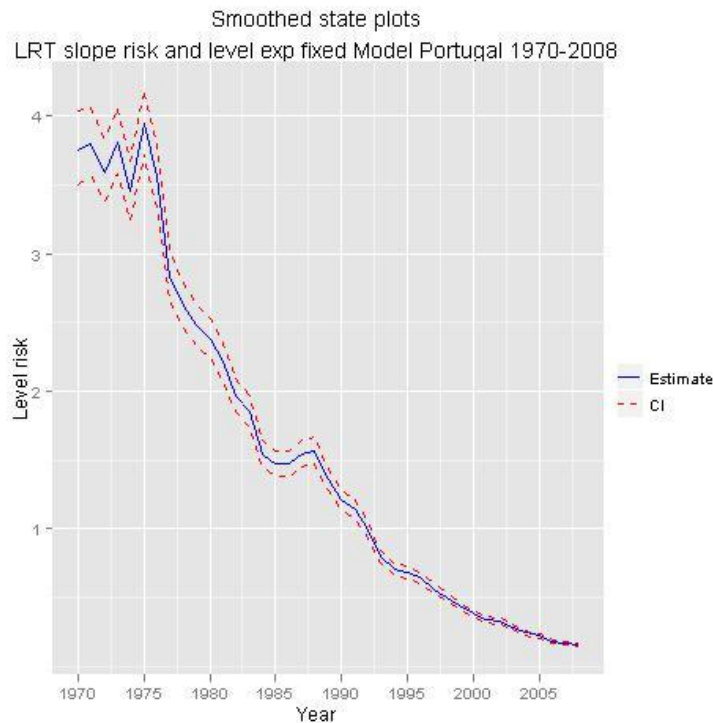### Plot of vehicle fleet in Portugal

- 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 for traffic volume is the annual vehicle fleet (per thousand).
- The annual vehicle fleet is available for Portugal from 1970 to 2008. There is an obvious break in the series in 1990: In the period before 1990 data on motor vehicles was provided by the National Authority of Transport but the numbers were overestimated because not all the scrapped vehicles were removed from the database. From 1990 onwards this data was replaced by an estimation of the number of vehicles in circulation done by ACAP (a Portuguese automobile association). In the forecasting model, this break is corrected by an intervention.
- There is a significant relation between the development of the traffic volume and of the annual fatality numbers in Denmark: the moments at which the increases in vehicle kilometres became stronger are also those at which the decreases in the fatalities became weaker.

T r a n s p o r t

Fatality Risk

- The fatality risk is the number of fatalities per thousand vehicles.
- Estimation model – technical definition:
  o Latent Risk Model [2,1]
  o Interventions in slope fatalities & exposure (1991-92 and 2008-2011)
  o Fixed slope risk and level exposure.
- CI: 68% confidence interval

Smoothed state plots
LRT slope risk and level exp fixed Model Portugal 1970-2008

— Estimate
-- CI

Level risk

Year

> The fatality risk has been decreasing on average by 8% annually.

- 1970-1975: stagnation
  o Social unrest (Marcelist spring)
  o Strong migratory movement from Mozambique (left hand driving) [3]
- 1975-1984: decrease
  o Socio economic stabilization
- 1985-1988: stagnation (increase)
  o Joining EEC
  o Surge in public expenditure and private consumption
  o Investment in infrastructure [3]
- 1989-2010: decrease

DaCoTA

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:
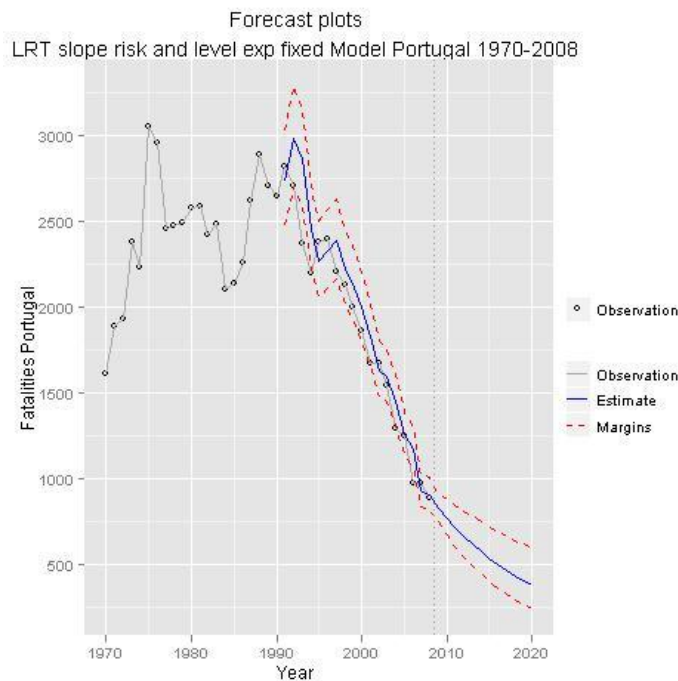
If RS efforts continue at the same level, the expected number of fatalities in 2020 is 375

Forecast plots
LRT slope risk and level exp fixed Model Portugal 1970-2008

Forecast of road-traffic fatalities in Portugal up to 2020

| Year	Prediction	Lower CI	Upper CI
2009	**826**	677	1006
2010	**768**	587	1007
2011	**715**	513	998
2012	**666**	449	986
2013	**620**	394	974
2014	**577**	346	962
2015	**537**	303	952
2016	**500**	265	944
2017	**465**	231	937
2018	**433**	201	933
2019	**403**	175	931
2020	**375**	151	931

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%).

Transport

Scenarios

- The strong uncertainty about the development of the fatalities in the Portugal is due to the development in traffic volume.
- To illustrate the uncertainty due to the traffic volume, three point-estimates for fatalities in Portugal 2020 are plotted assuming three different scenarios for traffic volume.
  - o Reference: growth (forecasted value)
  - o Scenario 1: strong growth (forecast plus 1 stand.dev.)
  - o Scenario 2: reduction (forecast minus 1 stand.dev.)
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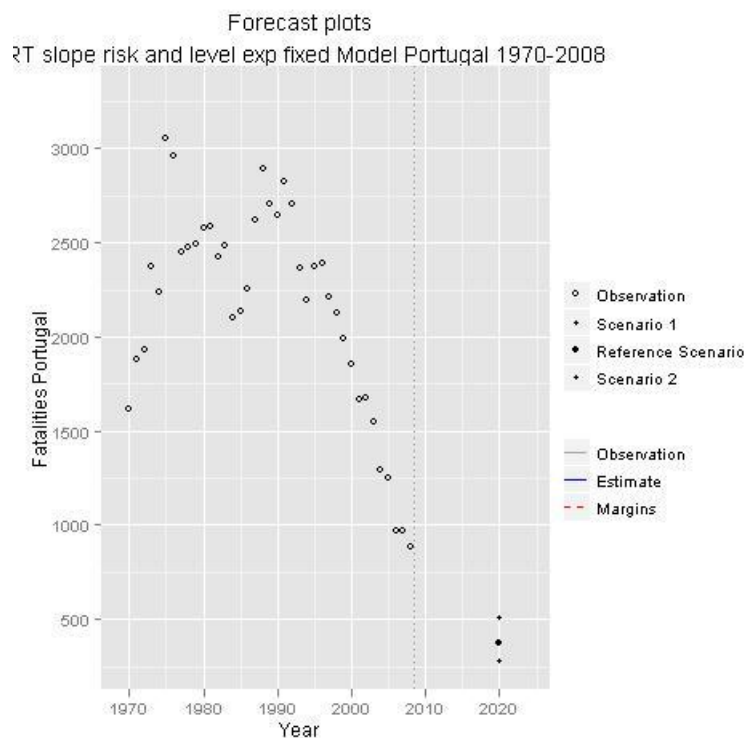
Scenarios for Traffic Volume

	Vehicle fleet (thousand)	Road traffic fatalities
Situation 2008:	5,716	885
Prediction 2020 according to mobility scenarios:		
- Growth	6,616	375
- Strong growth	8,954	507
- Reduction	4,888	278

References

|1] Dupont & Martensen (Eds.) 2012. Forecasting road traffic fatalities in European countries. Deliverable 4.4 of the EC FP7 project DaCoTA.

|2] 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.

[3] EC National Expert for road accident statistics and road safety performance indicators.

[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.