

2nd SafetyNet Conference
European Road Safety Observatory (ERSO)
Road Safety Management in Action
Evidence based policy setting for the European Community

Modelling road fatality trends in the European countries

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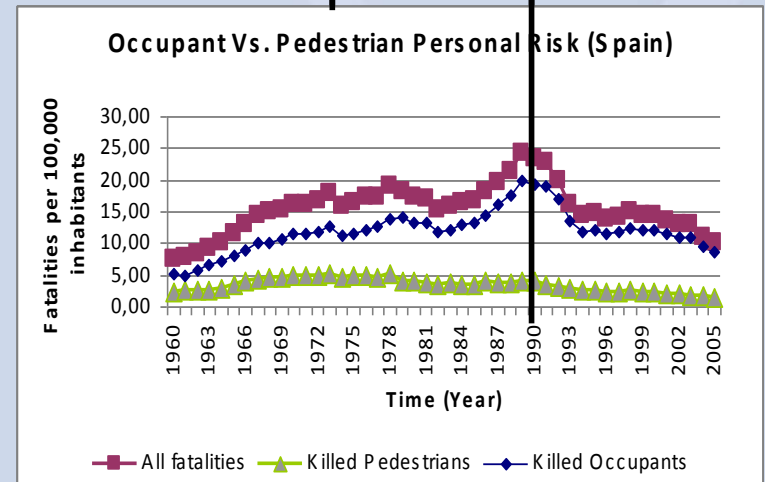
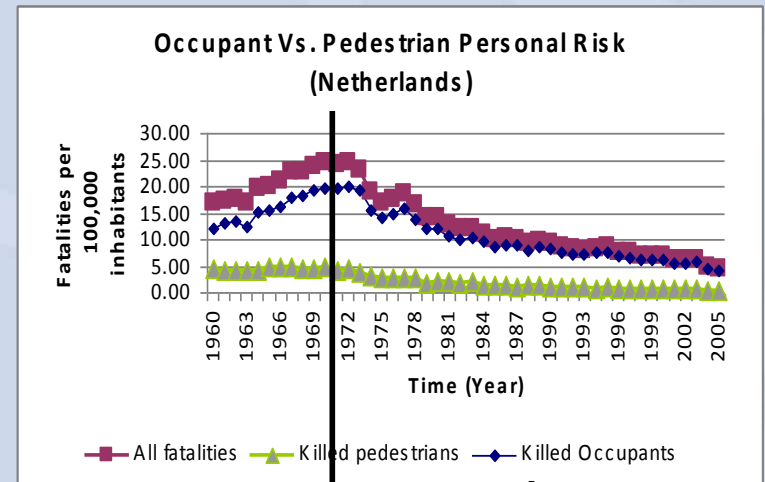
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Background and motivation

- Fatality figures of the commonly available time series (e.g. 1991 onwards in CARE) show a decreasing trend in most EU countries
- Considering longer time series (e.g. 1980 onwards in Eurostat) reveals a different trend for some countries: first increase – then decrease (level of motorization?)
- If even longer time series were available (e.g. 1960 onwards), one might be able to identify these trends for all countries, in slightly different forms

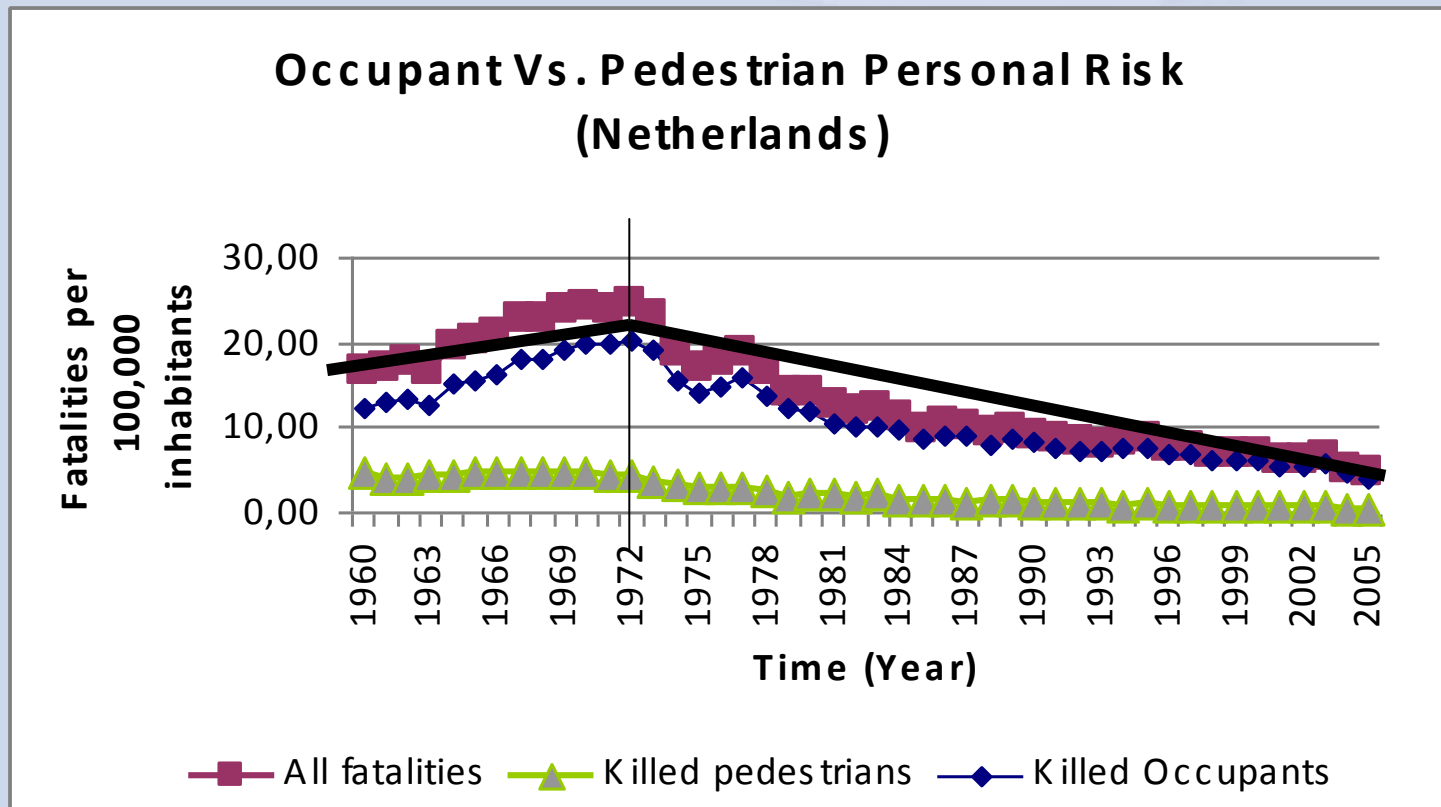
Research questions

- **From a road safety point of view**
- Is the trend “universal”? What causes it? (we suspect rate of motorization)
- Does the trend happen at the same time in all countries? (no, why? What does this lag capture or represent?)
- Can we use this to make predictions? (for countries for which the break has not occurred yet)



Research questions

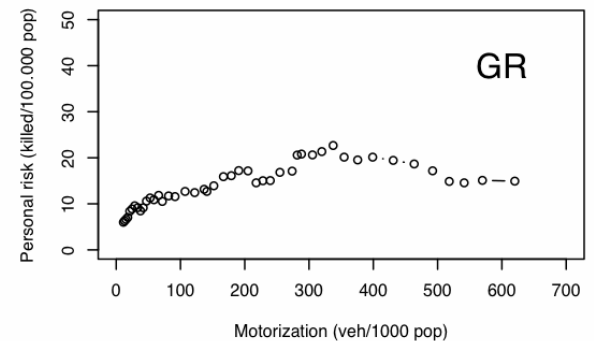
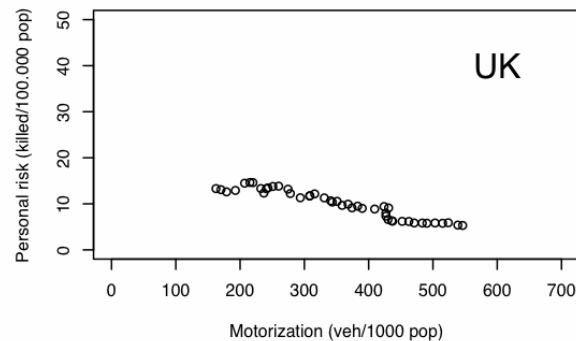
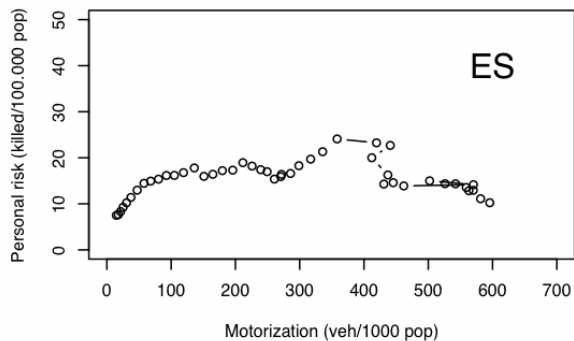
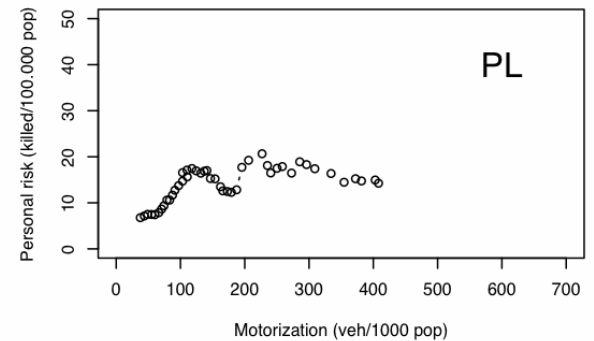
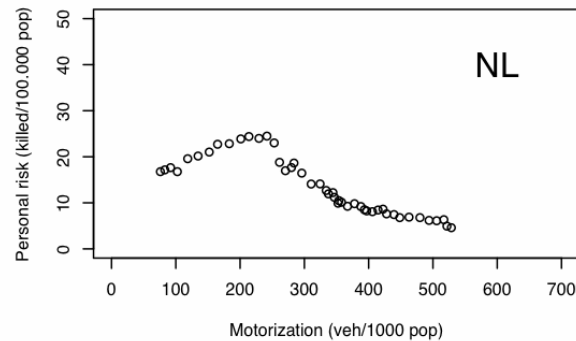
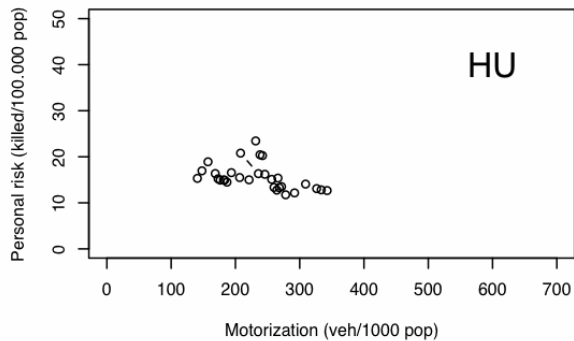
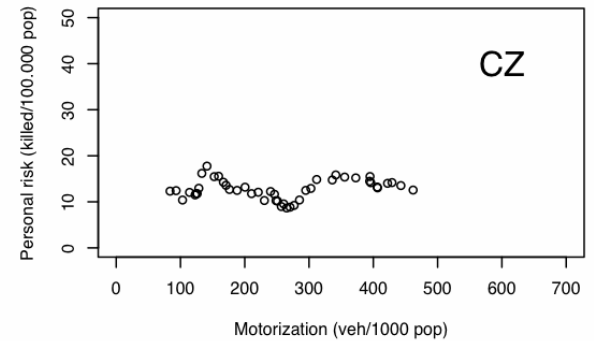
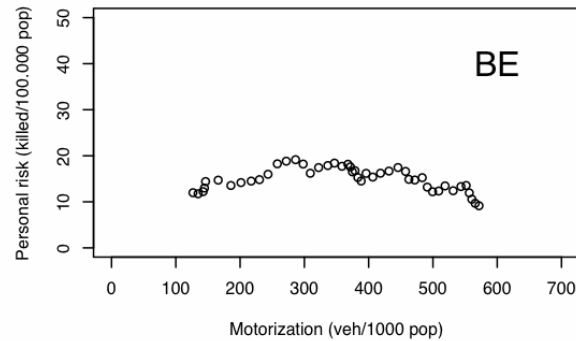
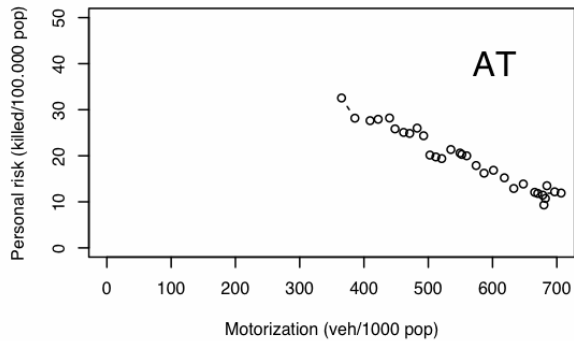
- From a statistical point of view:
Structural changes in trends



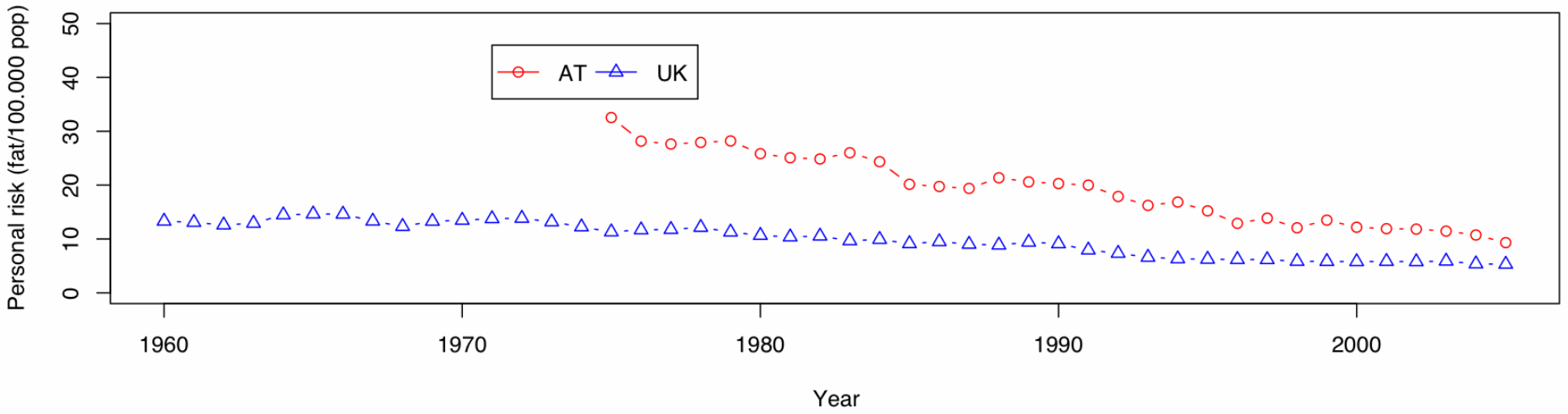
Data collected

- Time series data 1960-2005
- 11 countries (AT, BE, CZ, D, NL, PL, ES, UK, GR, HU, MT) – some more are expected
- Sources include CARE, SafetyNet, CARE Experts, SafetyNet partners
- Vehicle fleet by vehicle type
- Fatalities per road user type
- Population
- GDP (less complete)
- Data completeness slightly varies among countries (e.g. UK from 1960, GR and CZ from 1965, AT from 1975)
- Analysis within the proposed framework of SafetyNet data analysis methodologies.

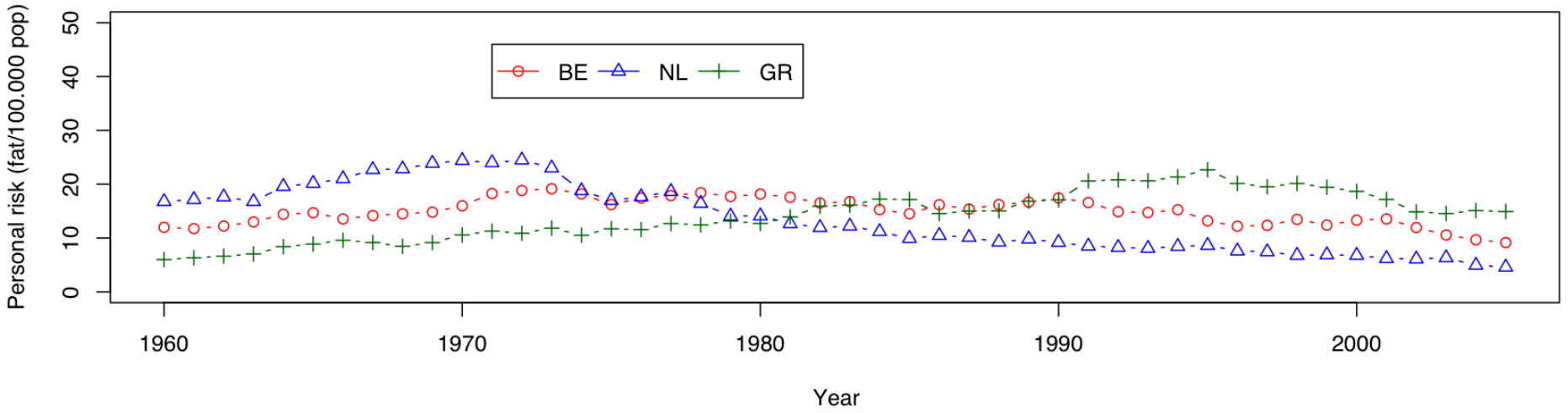
Personal risk vs. motorization



Personal risk vs. time



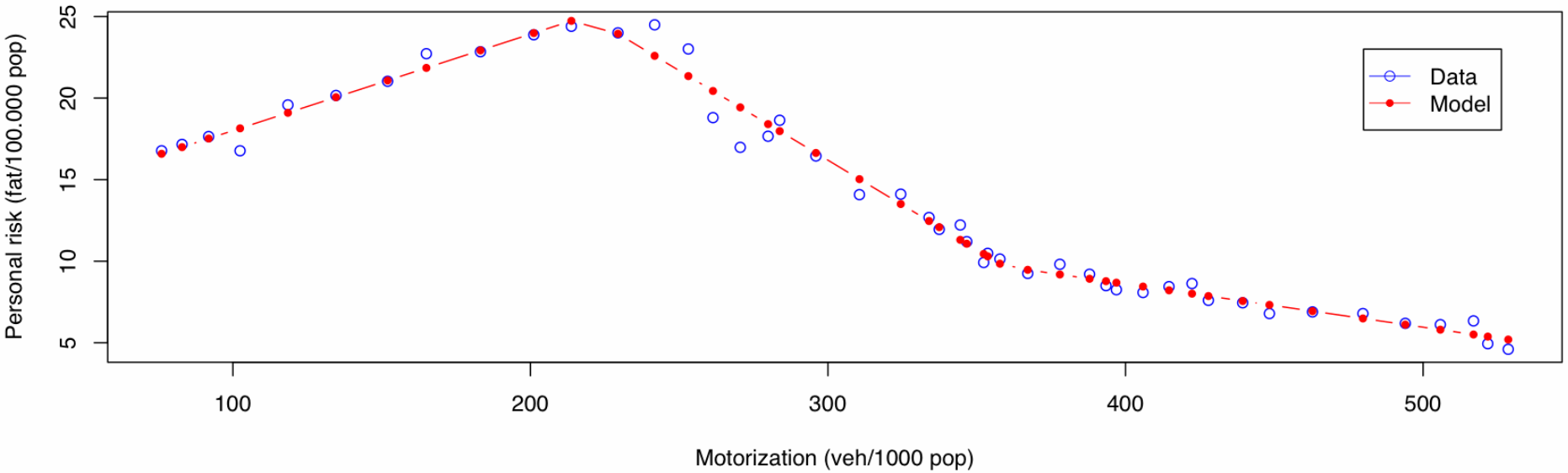
Personal risk vs. time



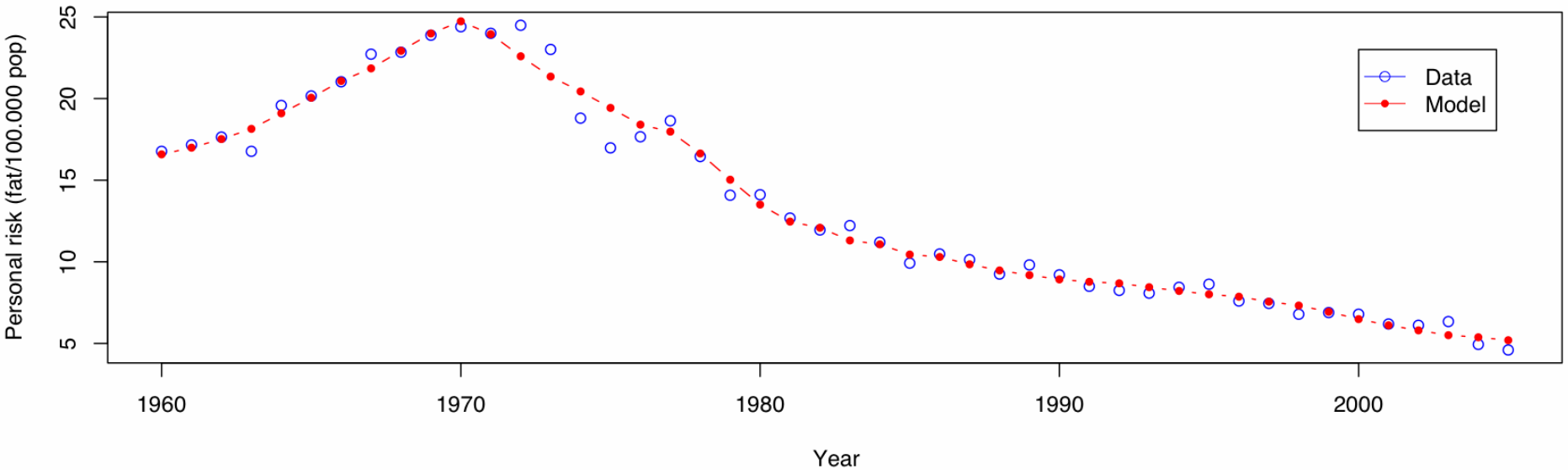
Methodology

- Simultaneous estimation of regression models with unknown breakpoints
 - Breakpoints' locations
 - Slopes
- Using **R** statistical package with **segmented** package
- Number of breakpoints and initial guess for their values are assumed as input

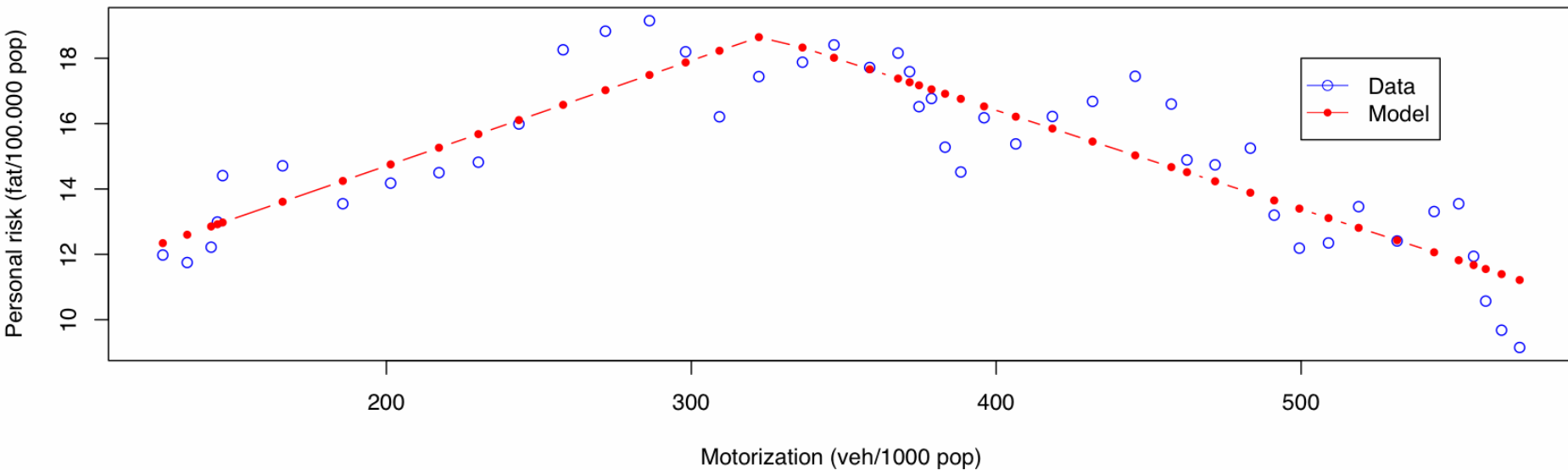
Netherlands – Personal risk vs. motorization



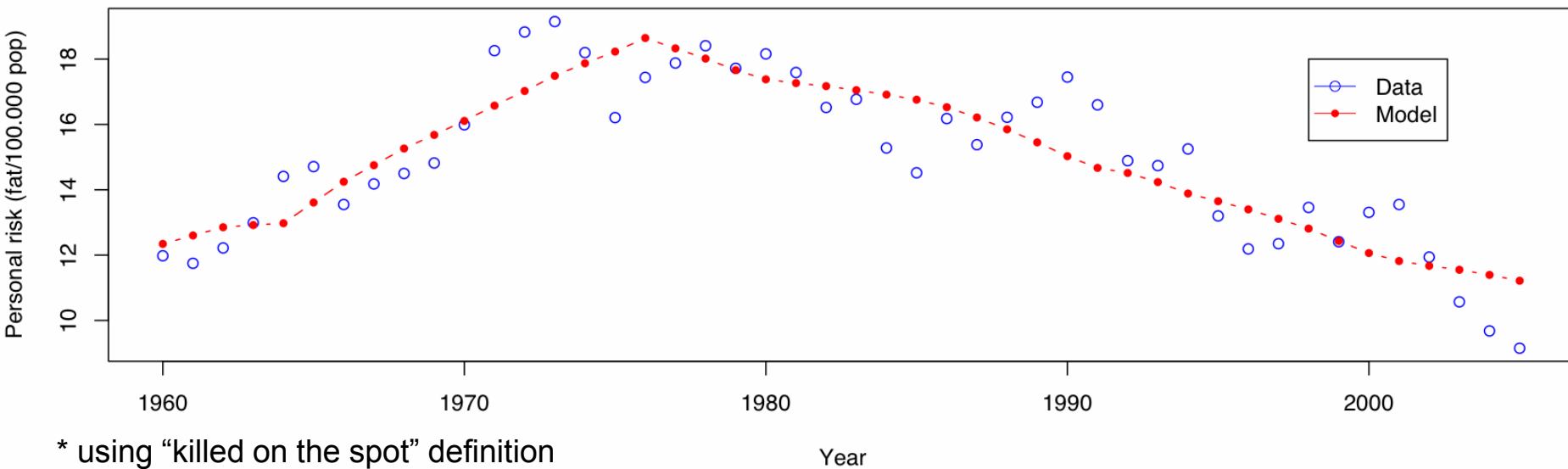
Netherlands – Personal risk vs. time



Belgium – Personal risk* vs. motorization

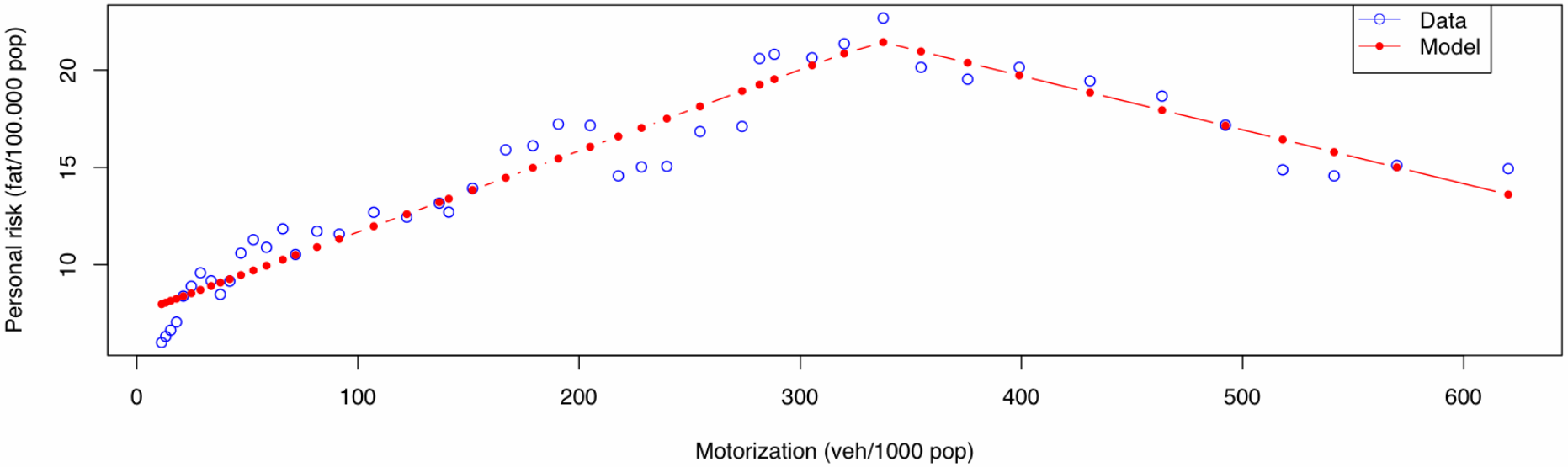


Belgium – Personal risk* vs. time

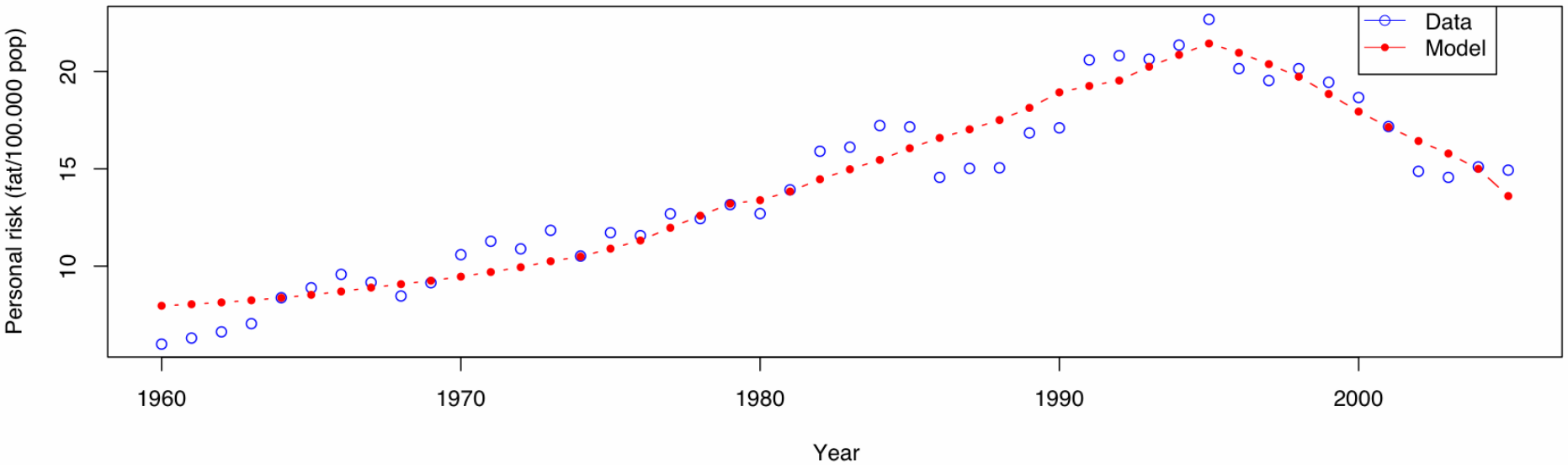


* using "killed on the spot" definition

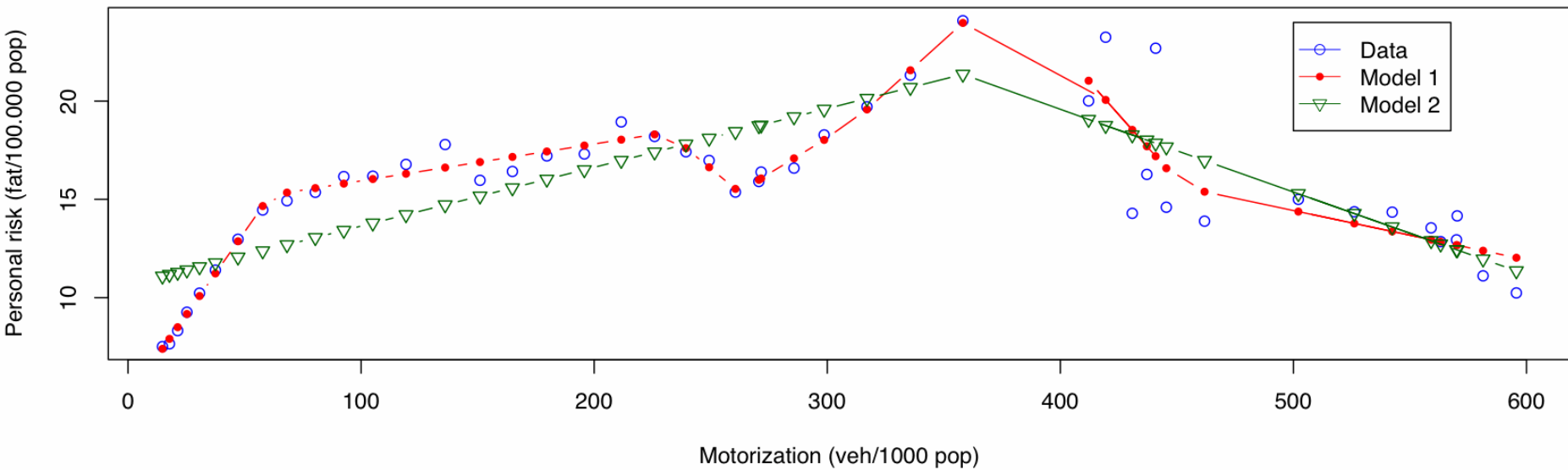
Greece – Personal risk vs. motorization



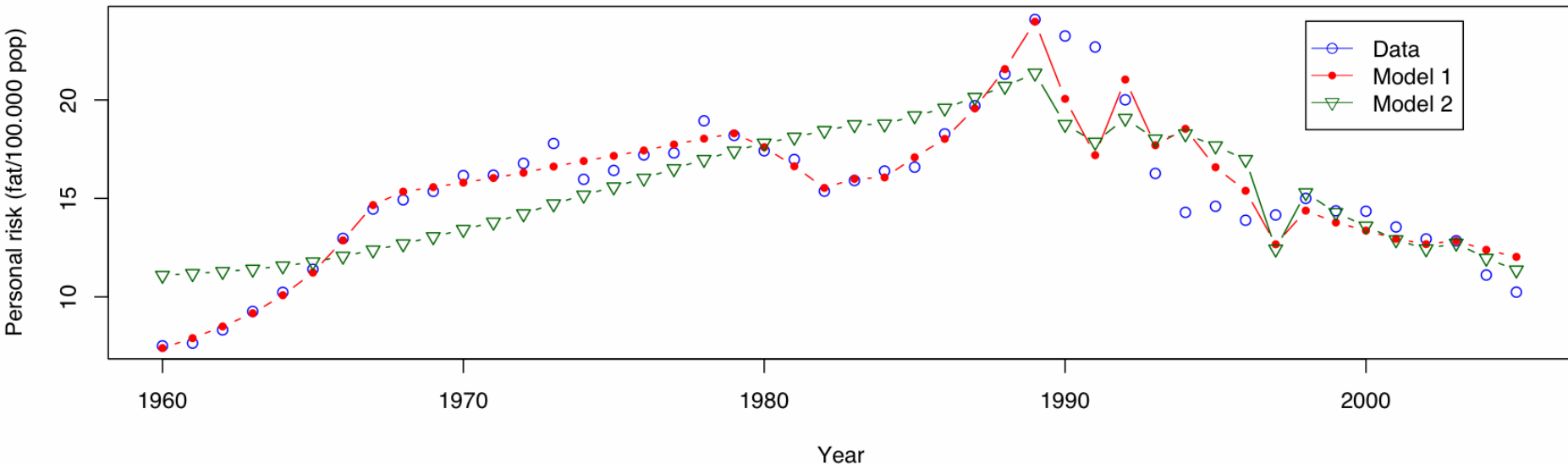
Greece – Personal risk vs. time



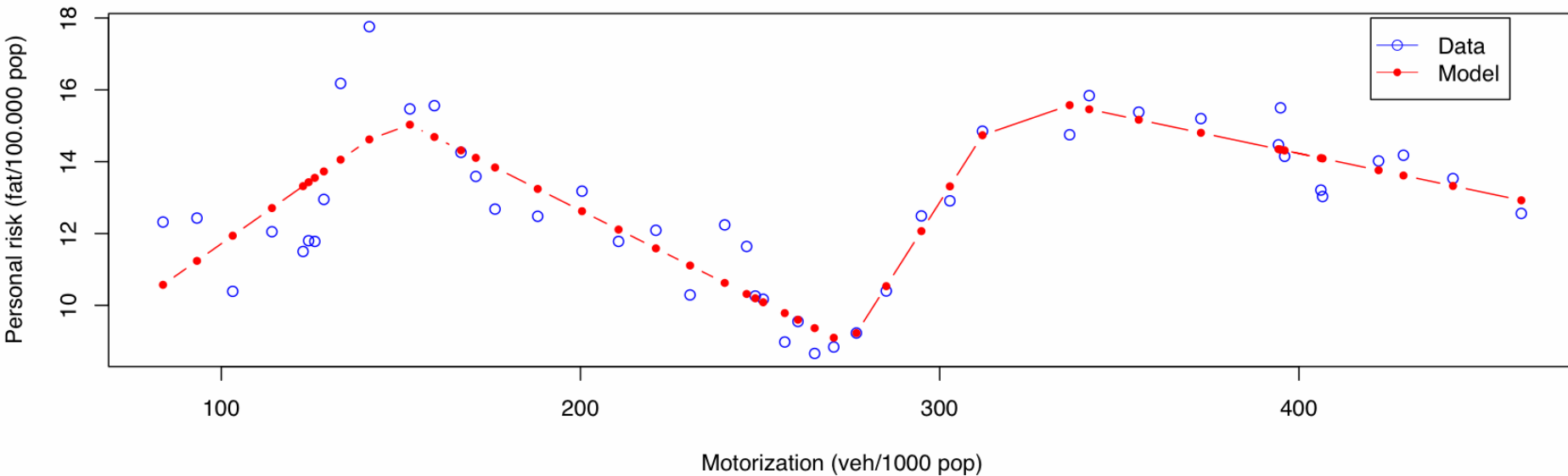
Spain – Personal risk vs. motorization



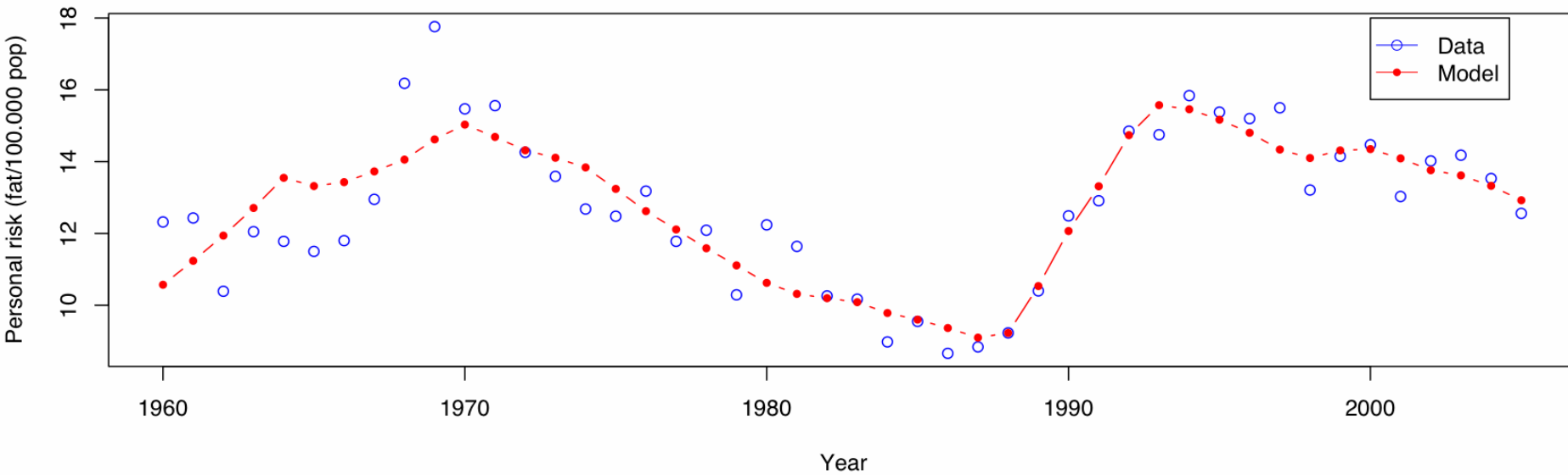
Spain – Personal risk vs. time



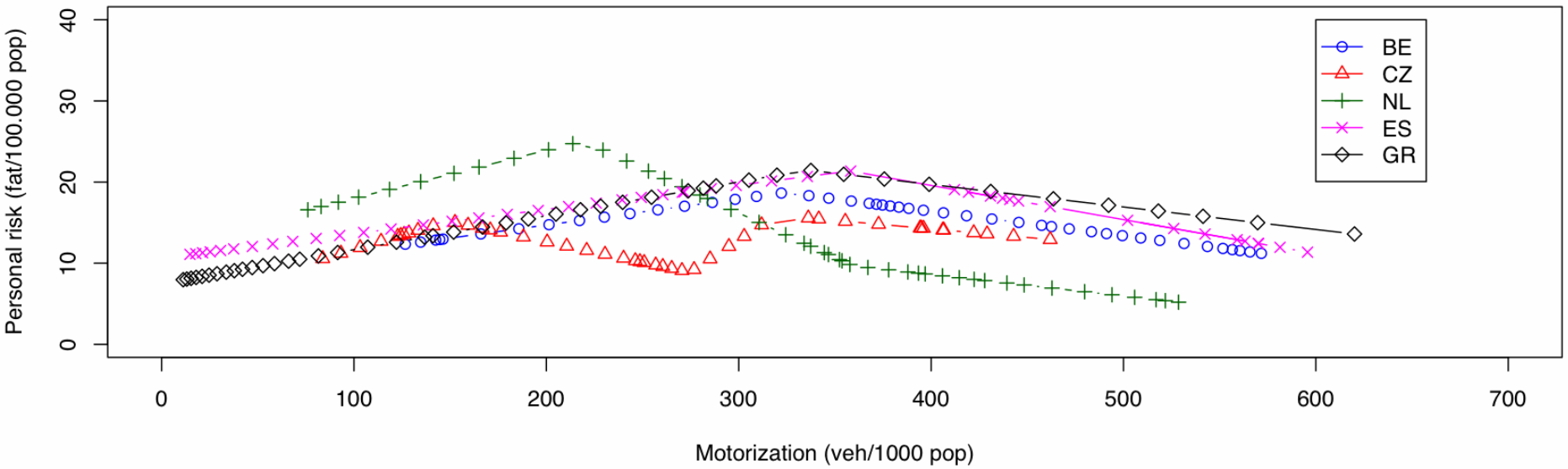
Czech Republic – Personal risk vs. motorization



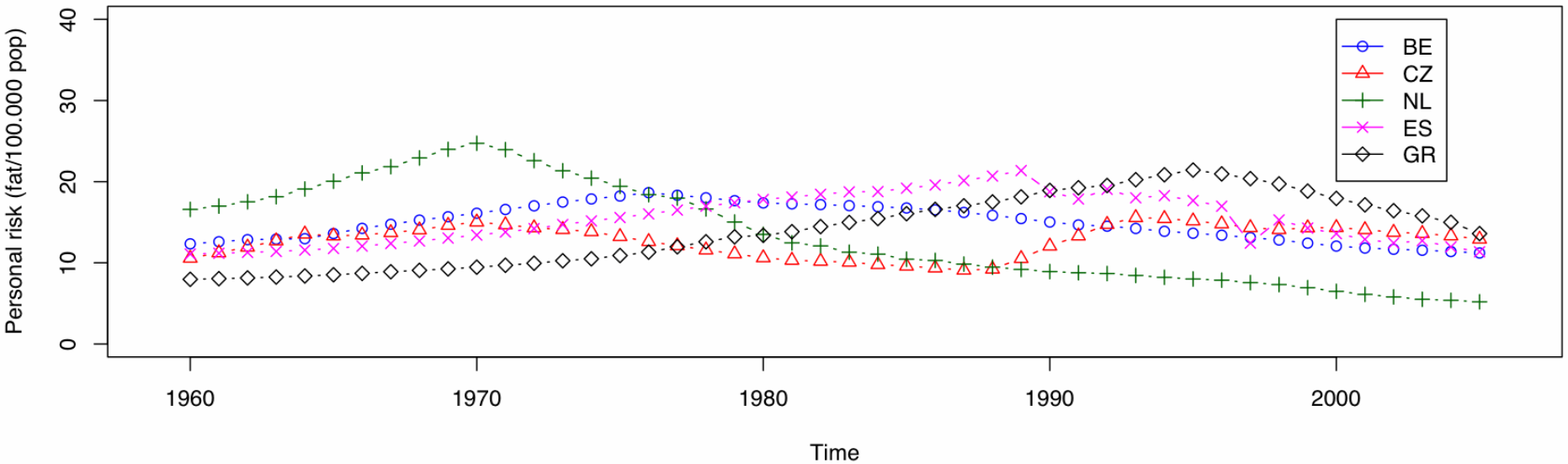
Czech Republic – Personal risk vs. time



Selected countries – Personal risk vs. motorization



Selected countries – Personal risk vs. time



Observations (1)

- The explanatory variable is motorization - not time
 - Time is useful in interpreting and comprehending
- Personal risk does not increase monotonically with motorization
 - Some distinct patterns can be distinguished
- Maximum personal risk (breaking point) seems to be consistent across countries
 - Around 20-25 killed/100.000 pop
- But the motorization/time range (breaking point) is wide in the countries examined :
 - Between 150 and 300 veh/1000 pop
 - Between 1965 and 1995

Observations (2)

- Different EU countries reached different motorization rates at very distant points in time
 - The modeled trends could be used to predict personal risk evolution for such countries
 - Predicting/expecting breakpoints can improve understanding of ongoing trends
 - Developing and third-world countries have not yet reached these motorization rates
- Macroscopic analysis of expected national/ regional risk trends
 - Enabling comparisons
 - Providing insight into the trends, similarities and differences

Observations (3)

- Personal risk depends on many exogenous factors, affecting (and obscuring) the underlying relationship, including social events and financial trends
 - Evidenced also by breakpoints without sudden motorization changes
 - Using the parsimonious vs. using the more detailed representation
- Personal risk at the national level depends highly on the measures, programmes and strategies implemented as well as on the overall road safety culture

Conclusions (1)

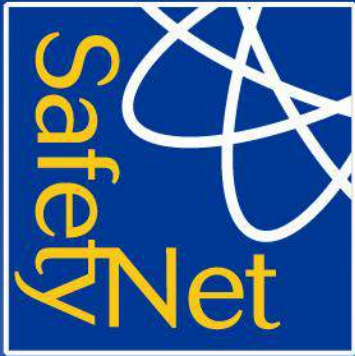
- Similar risk vs. motorization trends are observed in EU countries
 - Similar maximum personal risk
 - At different times and
 - Motorization levels
- Breakpoint estimation and analysis can help in:
 - Exploring underlying structural changes
 - Prediction of break-points for other countries
- Need to develop further insight into other contributing factors and extend the model
 - Functional form
 - Explanatory variables

Conclusions (2)

- It is interesting to compare a country's performance with the expected average performance for its current level of motorisation, identifying thus the best performing countries
- Demonstration of the practical value and application of SafetyNet data
- More data and further refinement of methodologies are needed to support further analysis

Further research

- Analysis of structure of trends for all EU countries
- Systematic identification of groups, capturing countries with similar trends
- Interpretation of patterns and prediction of trends for countries “behind the breakpoint”



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