

Safety trends in EU Member States: is there a learning pattern across nations?

Attila Borsos, PhD

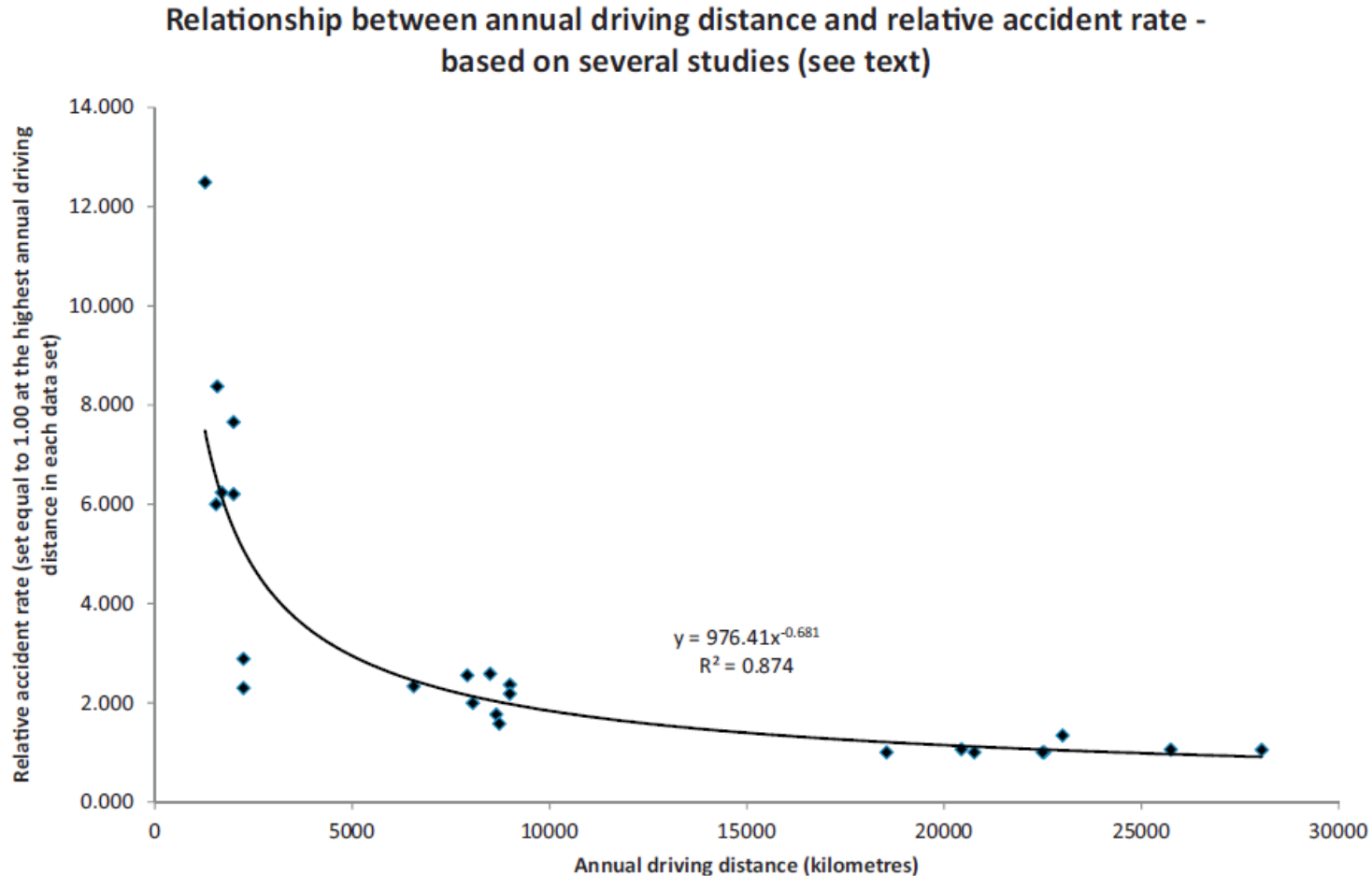
University of Győr, Hungary



Contents

- Learning processes
 - Individual learning
 - Societal learning – Smeed's law and its modification
 - Learning across nations
- EU trends – delay and advance
- EU trends – learning across nations
- Discussion

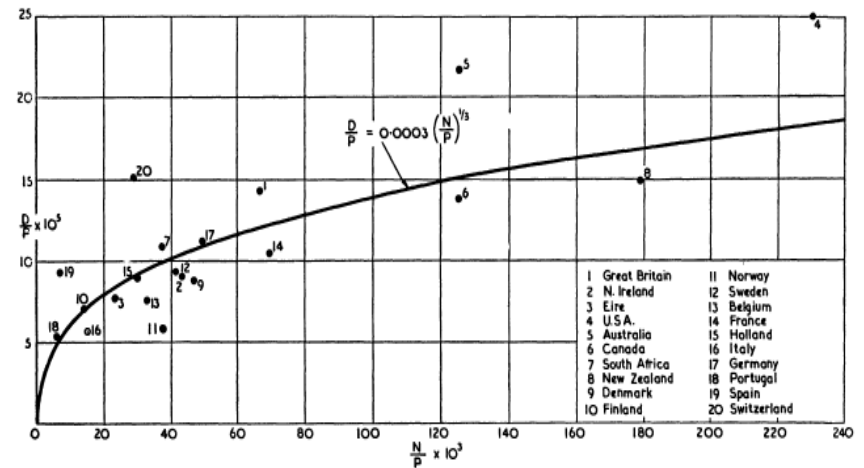
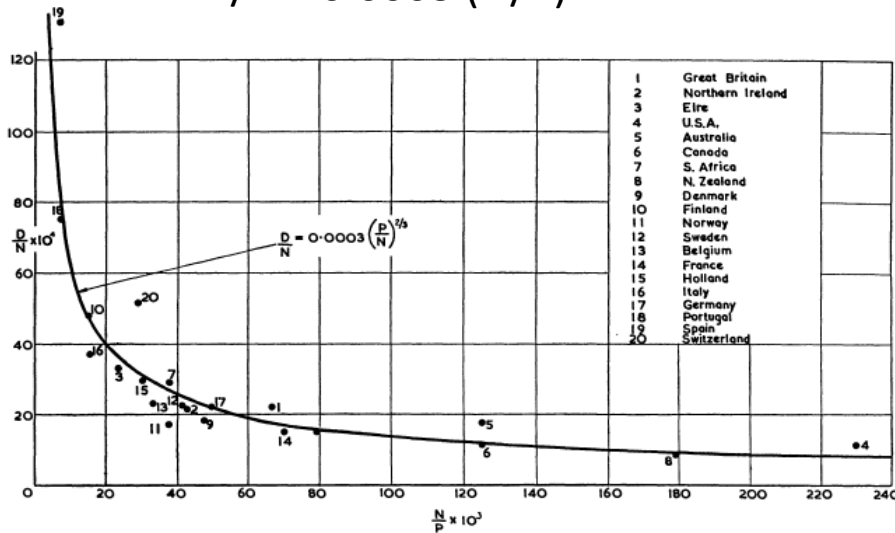
Individual learning



Elvik, R., 2015. Some implications of an event-based definition of exposure to the risk of road accident, AAP 76 15-24

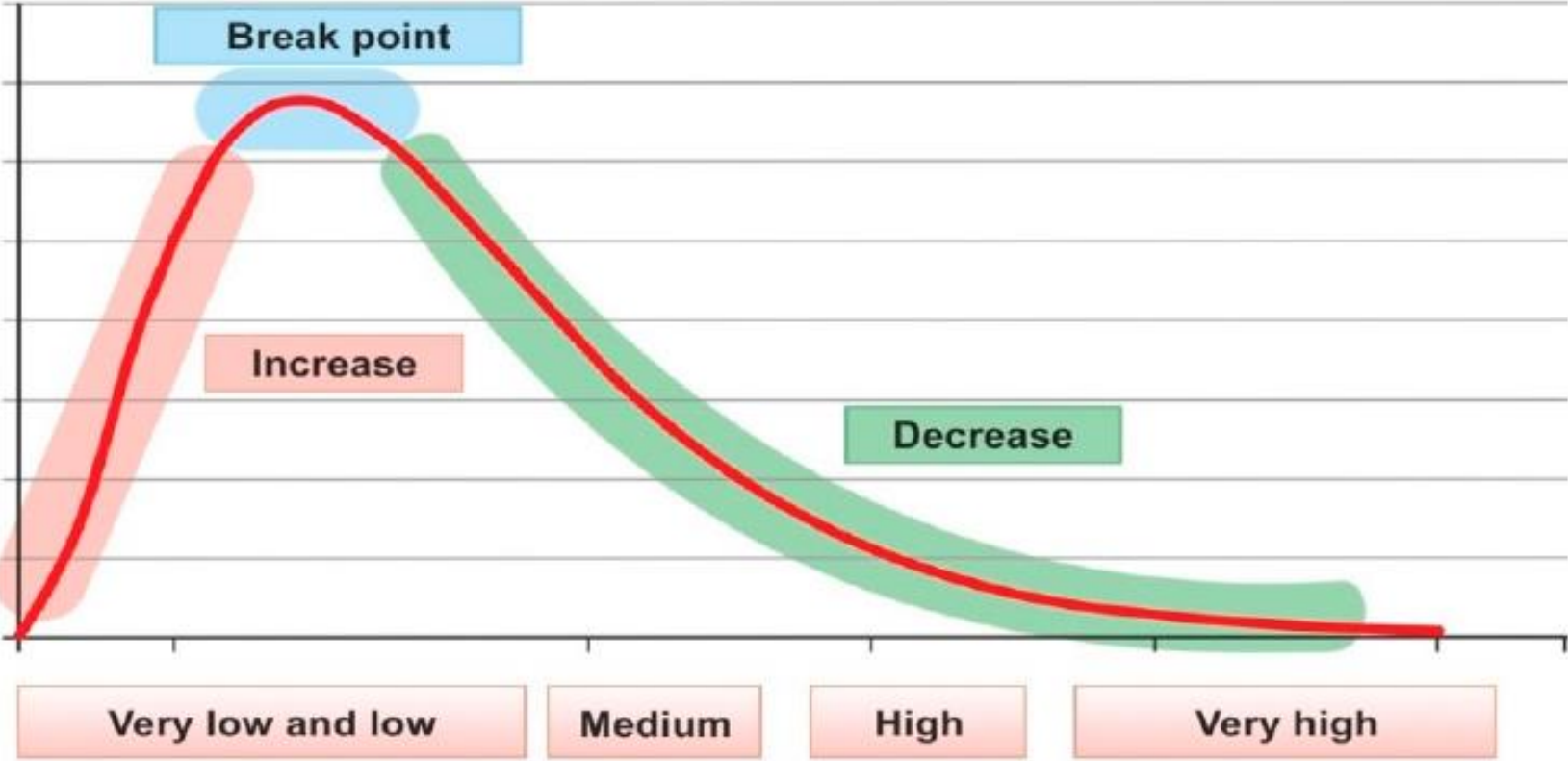
Smeed's law

- Smeed's formula (1949): $D = 0.0003 (N \cdot P^2)^{1/3}$
 - D – road fatalities
 - N – number of registered vehicles
 - P – population
- Two ways of interpretation:
 - $D/N = 0.0003 (N/P)^{-2/3}$
 - $D/P = 0.0003 (N/P)^{1/3}$



Societal learning

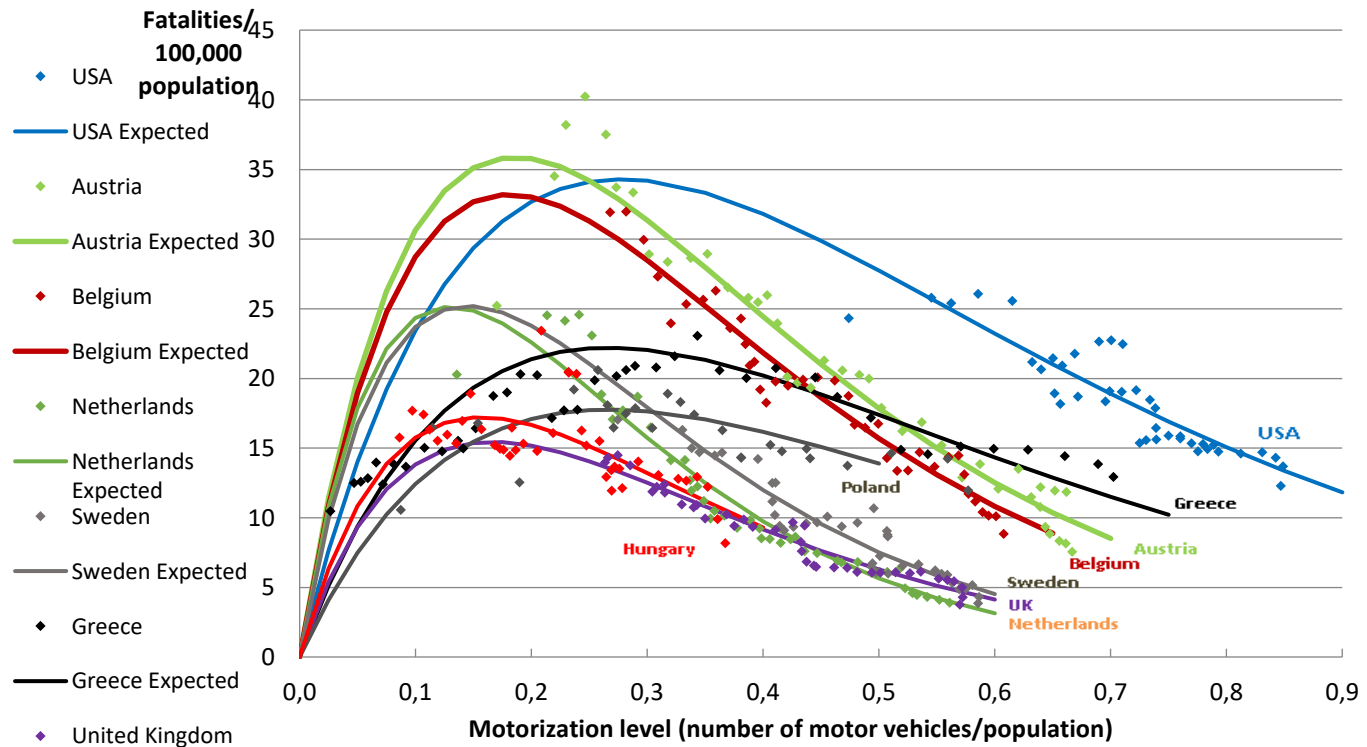
Mortality rate



Motorization

Road safety evolution phases

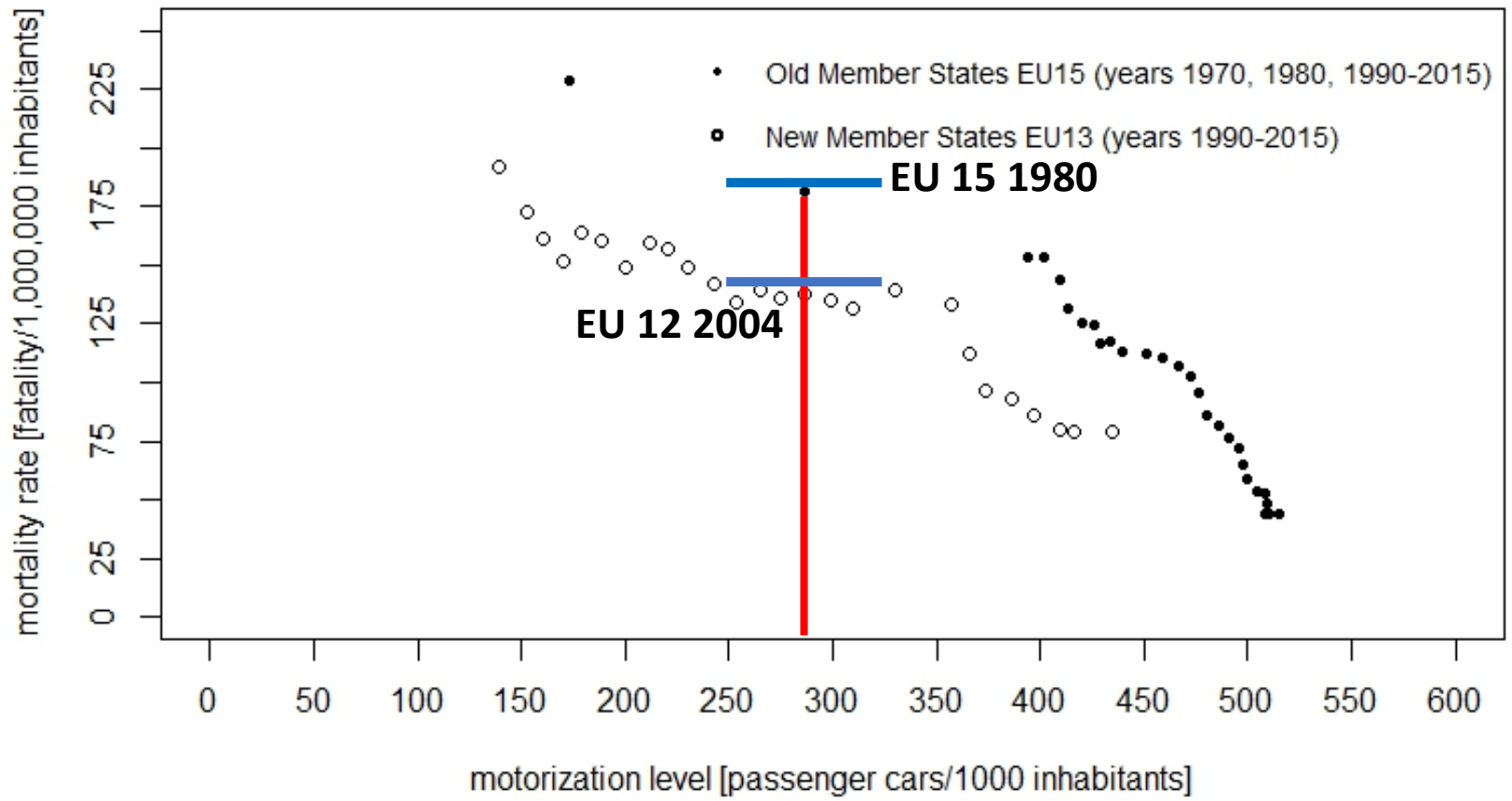
- $D/P = a \cdot N/P \cdot e^{-b \cdot N/P}$
- $a \cdot N/P$: increasing exposure due to the growing number of vehicles
- $e^{-b \cdot N/P}$: decreasing risk due to the development in EEE



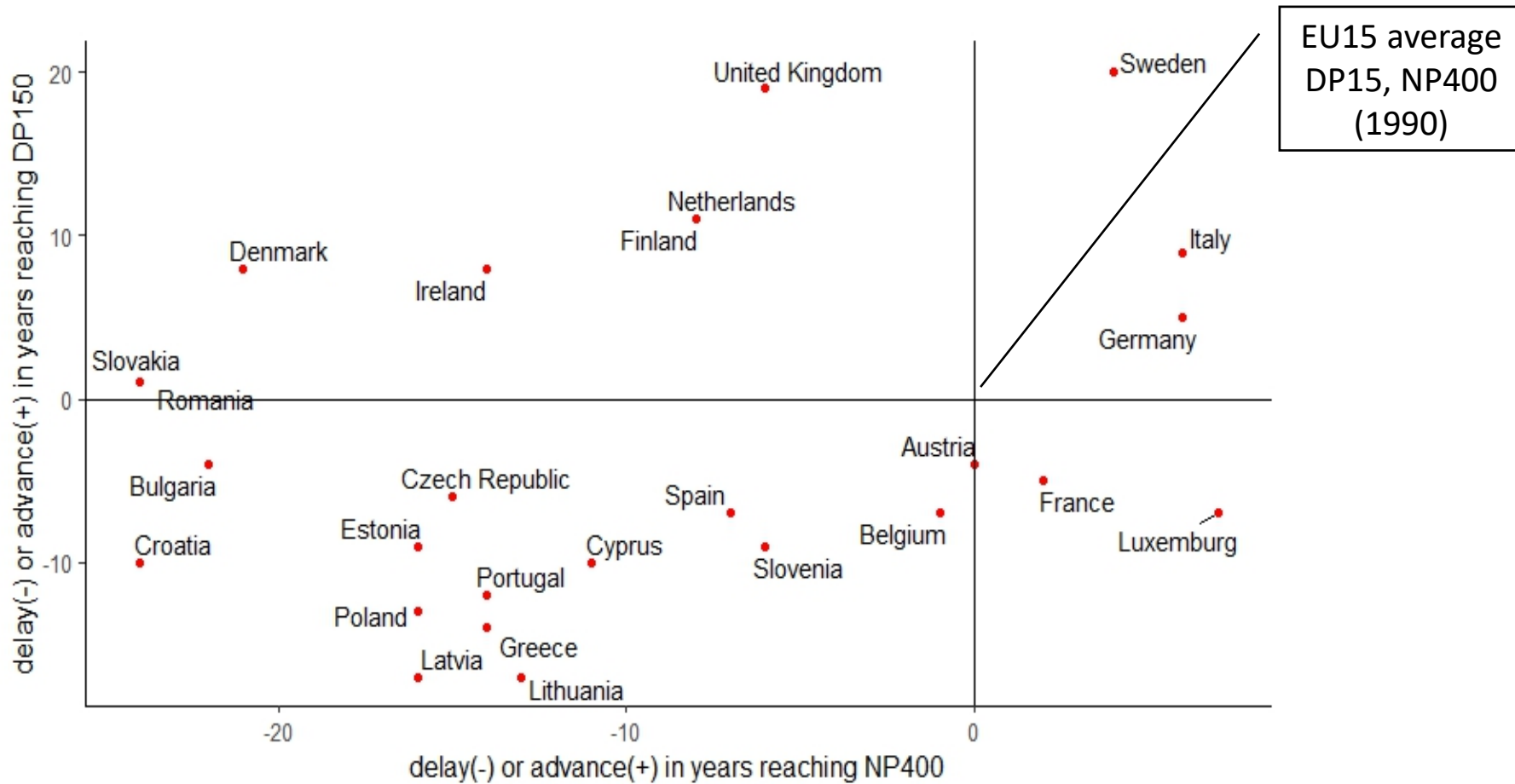
Research questions

- What kind of differences are there in between countries regarding the speed of their improvement in safety in relation to their motorization level?
- What learning pattern can we identify across nations, if there is any?

Fatality rates vs. motorization (EU 15, EU 12)



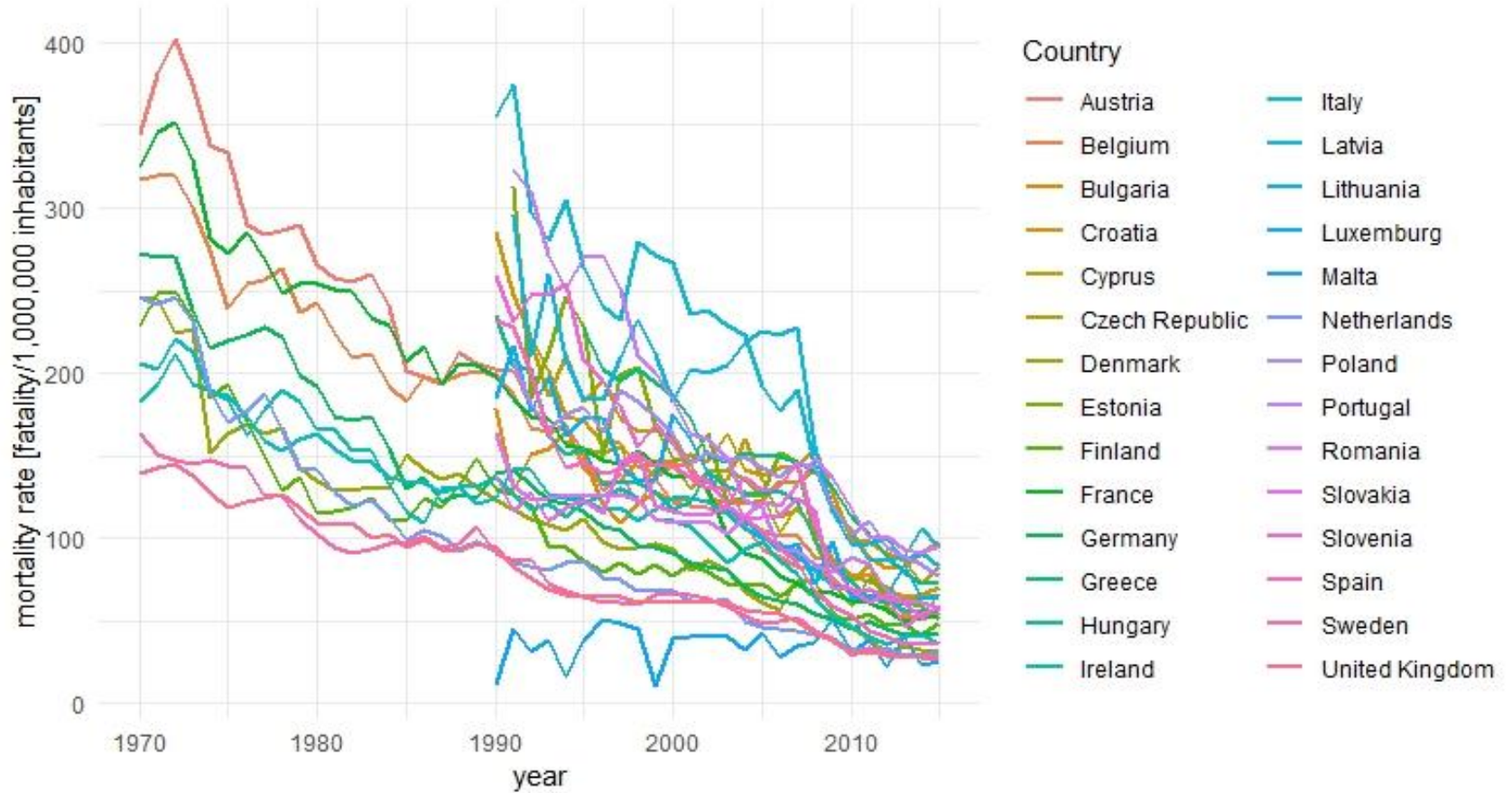
Delays of countries in reaching EU15 average



Conclusions

- Latecomers can improve their safety performances quicker than other countries due to:
 - the free movement of new technologies;
 - the international exchange of safety experiences;
 - the social attitude towards safety is increasing and also converging in the European countries.

EU safety trends

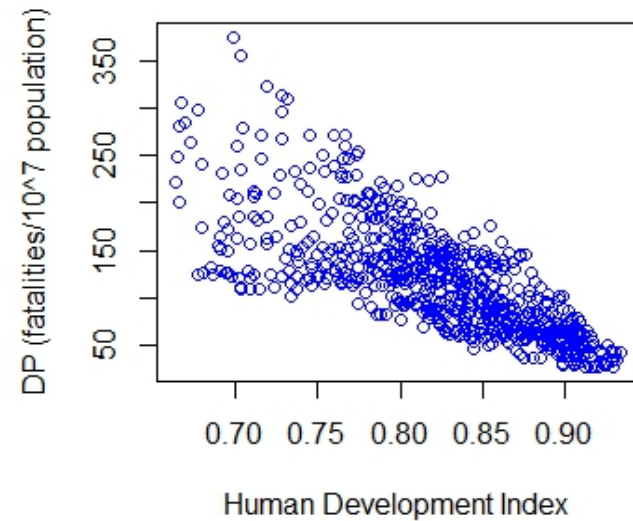
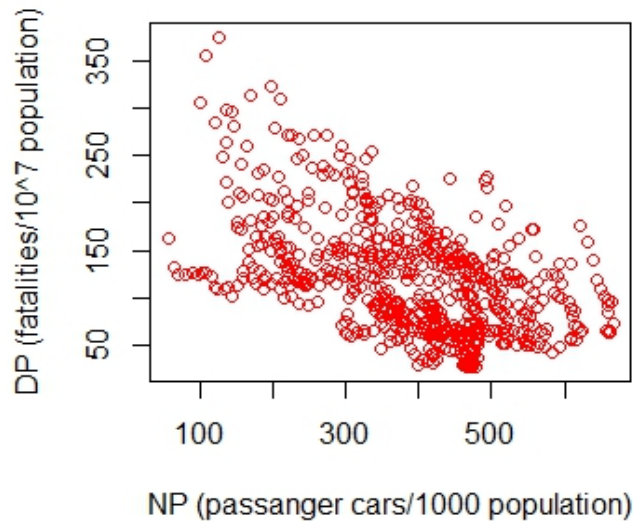


Learning across nations

- Research funding received by a country in the frame of road safety related international projects.
- Intensity of collaborations in road safety between countries.
- Transfer of knowledge on new technological, design etc. solutions.
- A country's ability to receive and adopt safety related knowledge.
- ...
- But what variable to use?

Human Development Index as a proxy

- HDI components:
 - life expectancy index – human life is valued
 - education index – intellectual values
 - Gross National Income (GNI) – income level



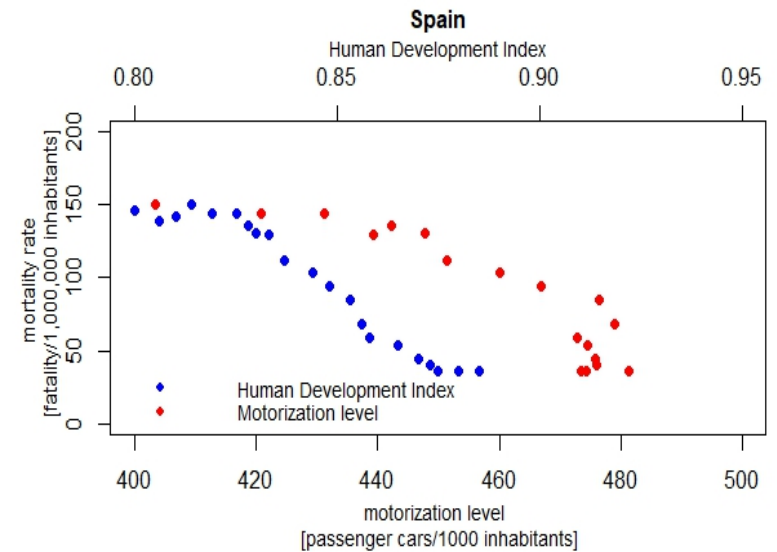
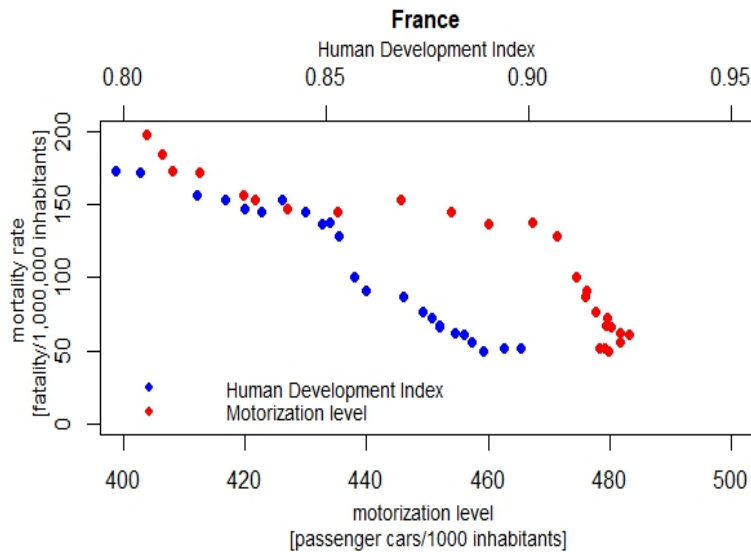
Panel regression (NP vs. HDI)

- 3 models: pooled, time-fixed effects, country fixed effects
- HDI models perform better, show less variation

Model	Passenger car ownership (NP)			Human development index (HDI)		
	Intercept	Slope	R ²	Intercept	Slope	R ²
Pooled	5.431***	-0.0020***	0.2425	9.9982***	-6.5065***	0.5991
Fixed effects (time)	year specific ¹	-0.0009***	0.5251	year specific ³	-5.1539***	0.7029
Fixed effects (country)	country specific ²	-0.0040***	0.7554	country specific ⁴	-7.7605***	0.8131

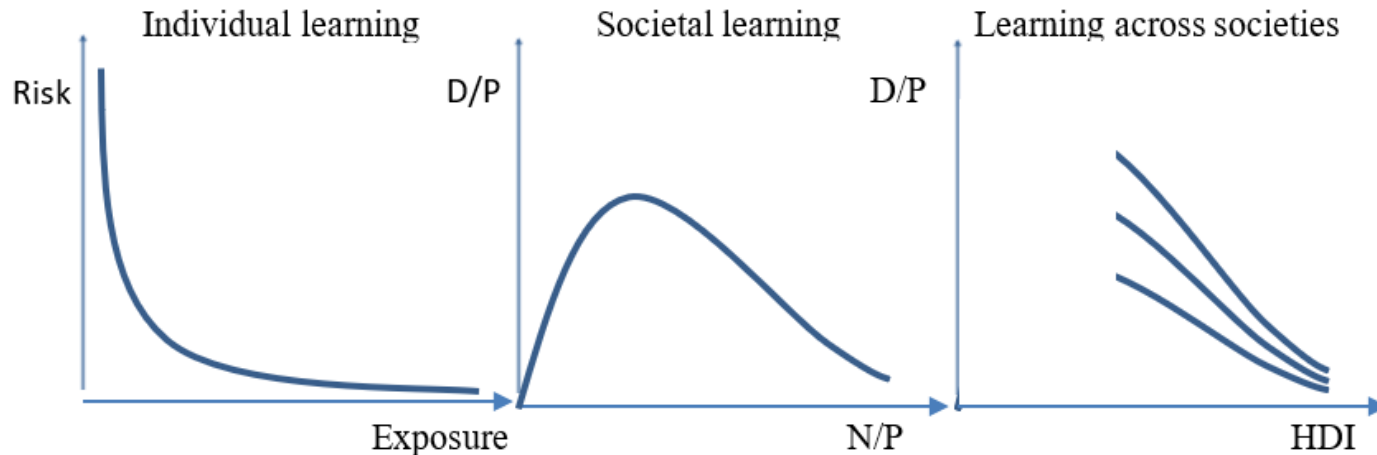
Significance codes: * $p \leq 0.05$ ** $p \leq 0.01$ *** $p \leq 0.001$

Motorization level – another limitation



Summary

- 3 layers of learning
- Learning across nations is proposed
- Hard to be proven statistically – variable to be used?



Thank you for your attention!