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Correlation of road safety performance with social and economic indicators in the European Union

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Background

- **Road accidents** constitute a major social problem in modern societies, accounting for more than 1,2 million fatalities worldwide and 26.000 in the EU in 2014.
- The **European Union** has made substantial progress in improving road safety and reducing traffic fatalities: in the last decade the number of fatalities and injuries **decreased** by 45% and 30% respectively.
- These reductions may not be fully justified by policy efforts alone, and may be partly attributed to the global **social** and **economic** recession, affecting the mobility.
- Annual or occasional changes in **social** and **economic indicators**, may be associated with road safety changes. interrupting the smooth macroscopic trends.

Objective

The objective of this research is the correlation of road fatalities with basic social and economic indicators in the EU.

For this correlation a **database was developed** containing the most recent data regarding population, road fatalities, GDP per capita, HDI, unemployment rate and several other economic and social indicators for the 28 members of the EU.

Consequently **linear regression models** were developed for all countries tested and also for the different groups of countries that were selected (northwestern, eastern, southern countries).

Data

Most recent data for **28 EU countries** have been extracted from the following international databases: **Eurostat, UNDP, OECD**

1. Population
2. GDP per capita
3. Road fatalities per million population
4. Motorway density (km/million population)
5. Road infringement cases
6. Unemployment rate(%)
7. Suicides per 100.000 population
8. Human Development Index (HDI)
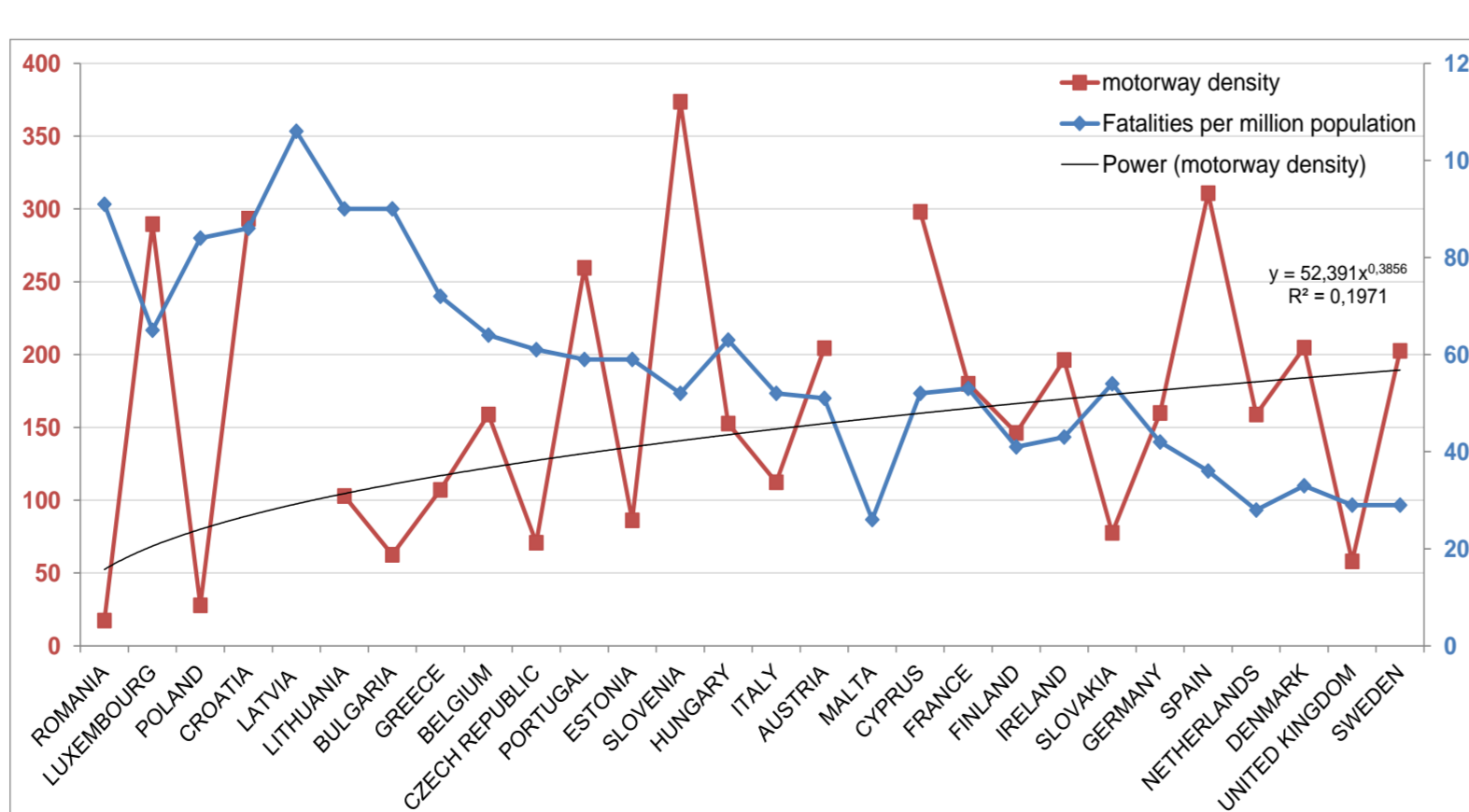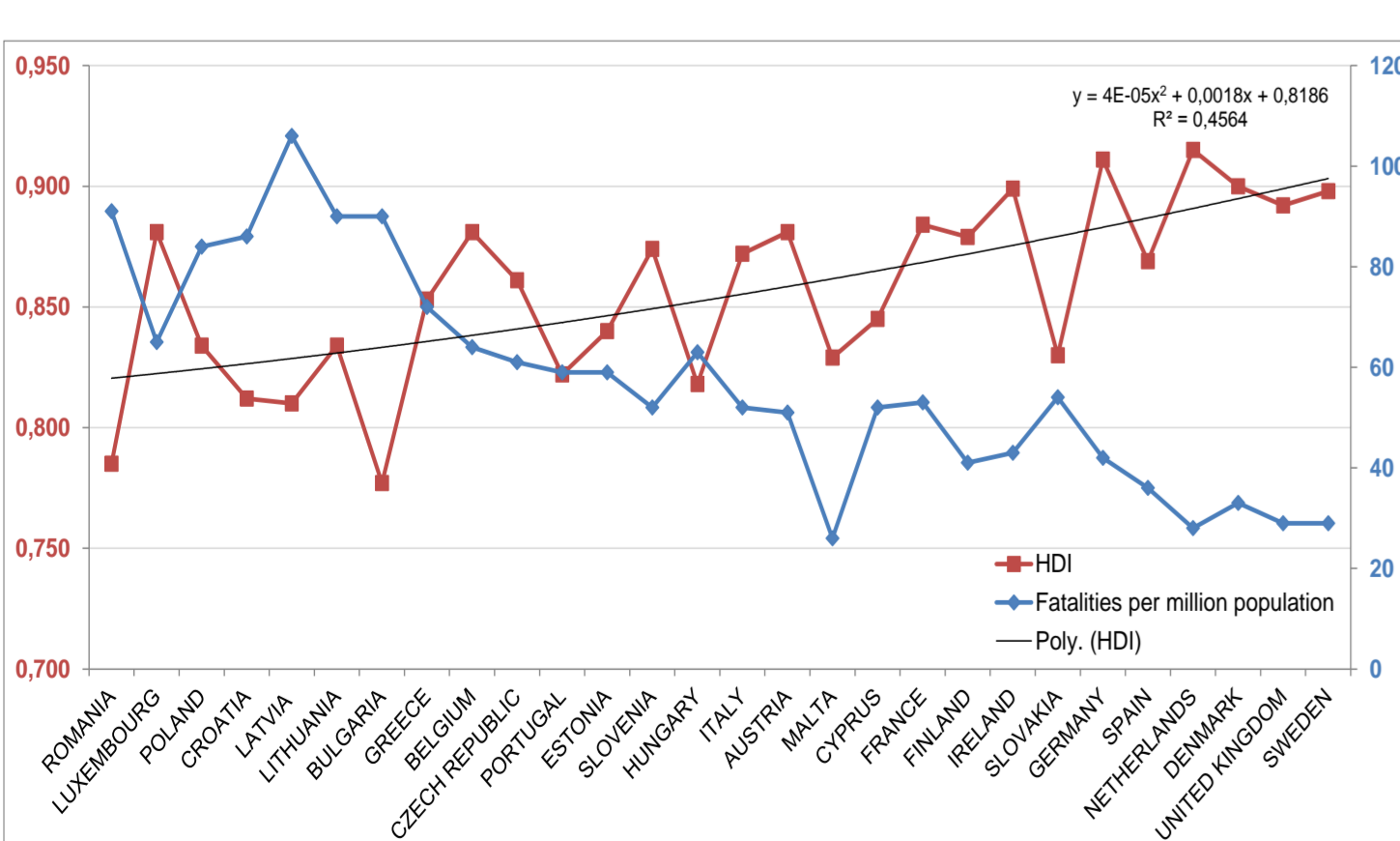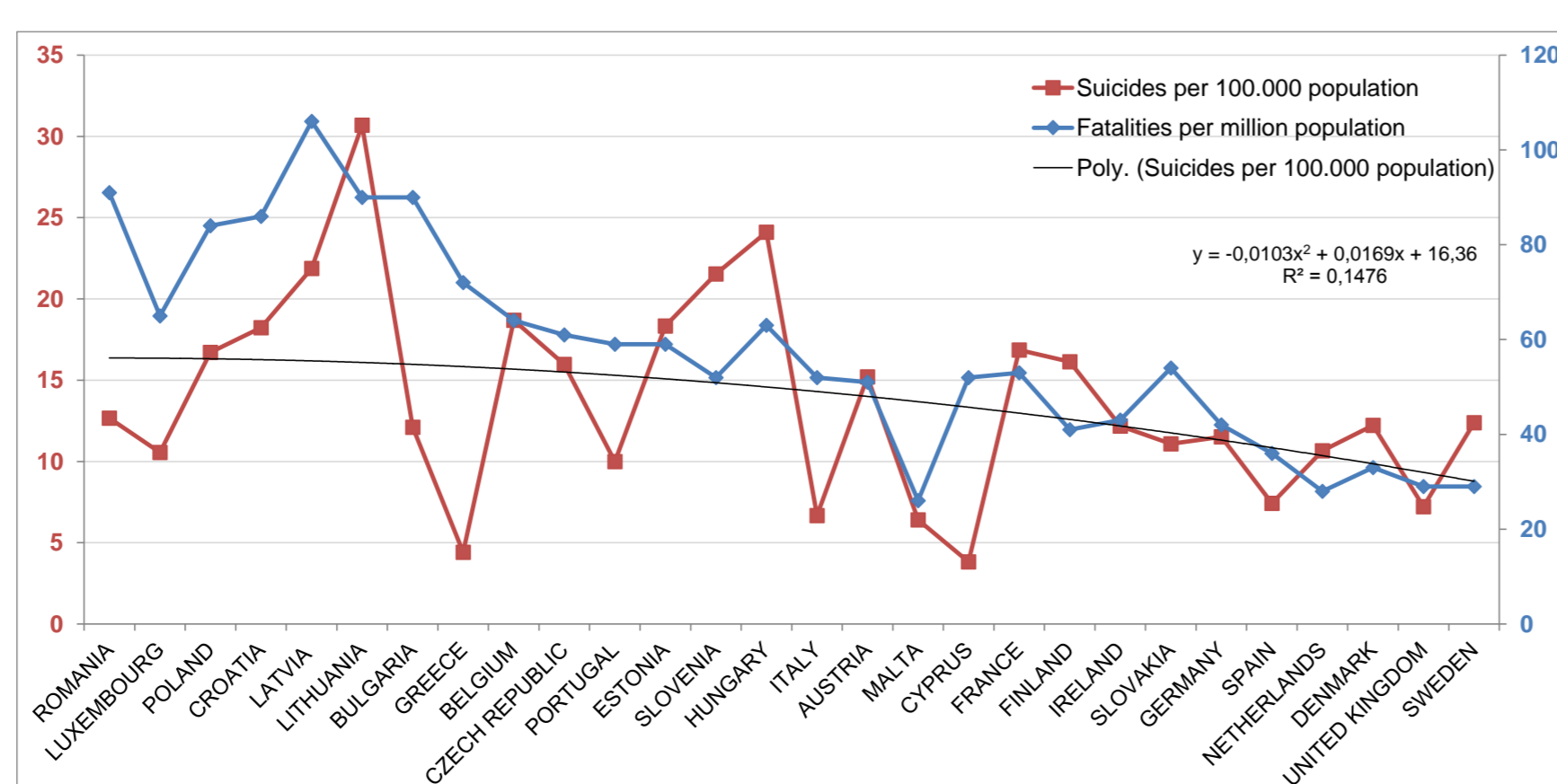9. HDI inequality adjusted

Methodology
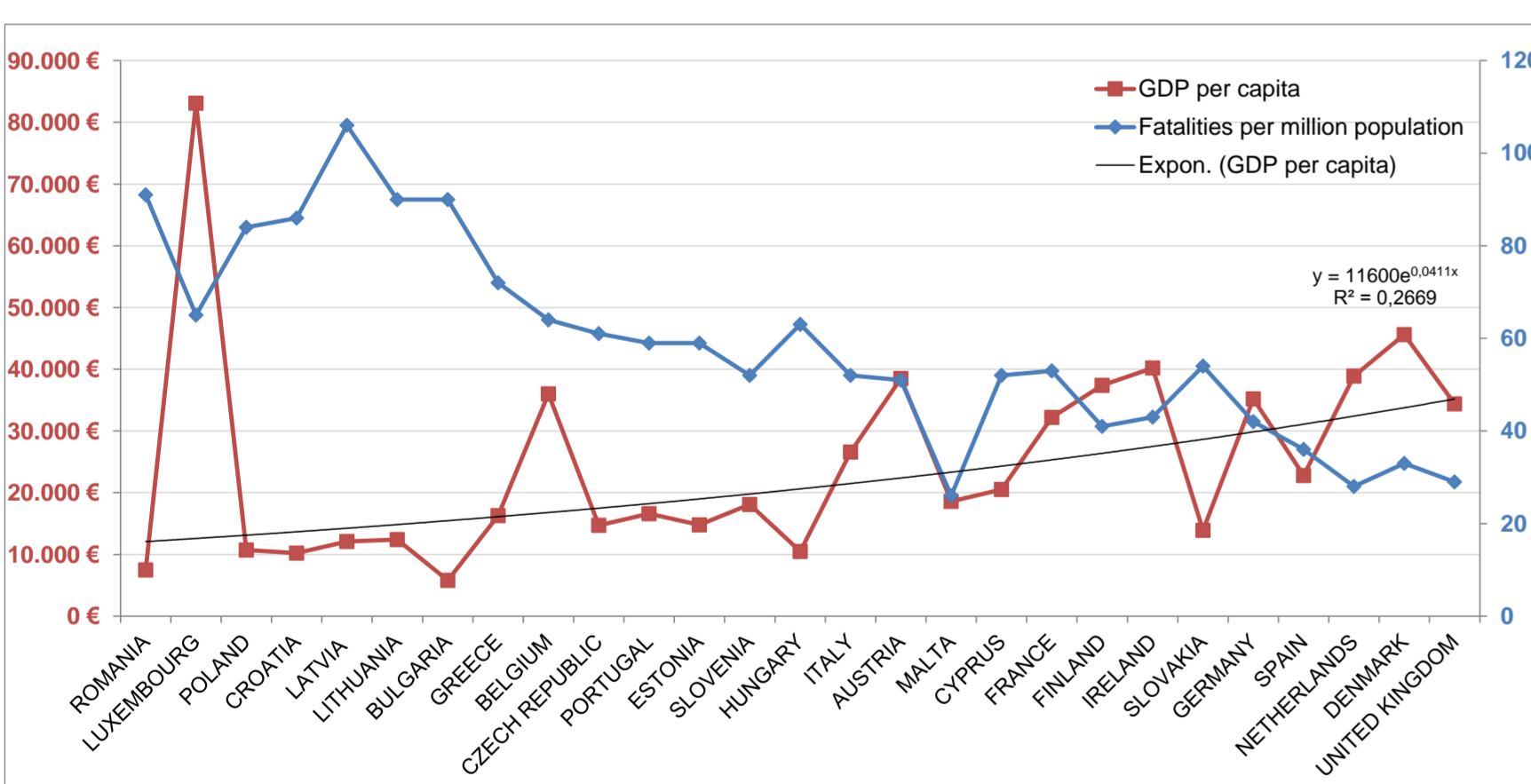
Lower road fatality rates in the EU are recorded in countries with relatively:
- high GDP per capita
- more dense motorway network
- higher HDI

On the contrary, countries which experience relatively **high road fatality rates** per million population have also high suicide rates per population.

Results

Model 1: All countries

	β	t	sig.	e_i
Intercept	424,634	6,494	0,000	
GDP	0,471	2,328	0,031	0,255
HDI	-466,973	-5,964	0,000	-7,667
Suicides	1,283	3,216	0,004	0,316
Motorway density	-0,048	-1,912	0,070	-0,160
Unemployment	1,063	2,101	0,049	0,205
R^2	0,795			

- An annual **increase** in GDP per capita or unemployment rates leads to an **increase** in road fatalities.

Model 2: Northern/Western countries

	β	t	sig.	e_i
Intercept	415,041	4,059	0,007	
HDI_adj	-492,236	-4,075	0,007	-10,462
Suicides	1,211	1,751	0,130	0,375
Motorway density	0,119	3,198	0,019	0,515
R^2	0,855			

- An **increase** in HDI is associated with **decrease** in road fatalities for all groups of countries.

Model 3: Southern countries

|	β	t	sig.	e_i
Intercept	973,381	4,495	0,139	
HDI	-1.040,105	-4,156	0,150	-17,32
Suicides	1,959	2,706	0,225	0,314
Motorway density	-0,122	-6,092	0,104	-0,528
Infringements	-11,815	-2,844	0,215	-0,329
R^2	0,979			

- A **positive relationship** between suicides rates and road fatality rates has been established for all EU countries.

Model 4: Eastern countries

	β	t	sig.	e_i
Intercept	347,096	3,617	0,022	
HDI	-357,502	-2,978	0,041	-4,538
Suicides	0,951	1,795	0,147	0,267
Motorway density	-0,080	-2,160	0,097	-0,192
Infringements	11,901	2,552	0,063	0,154
R^2	0,871			

- A change of the density of motorway network or the number of infringements has statistically significant effect on road fatalities.

Sensitivity analysis
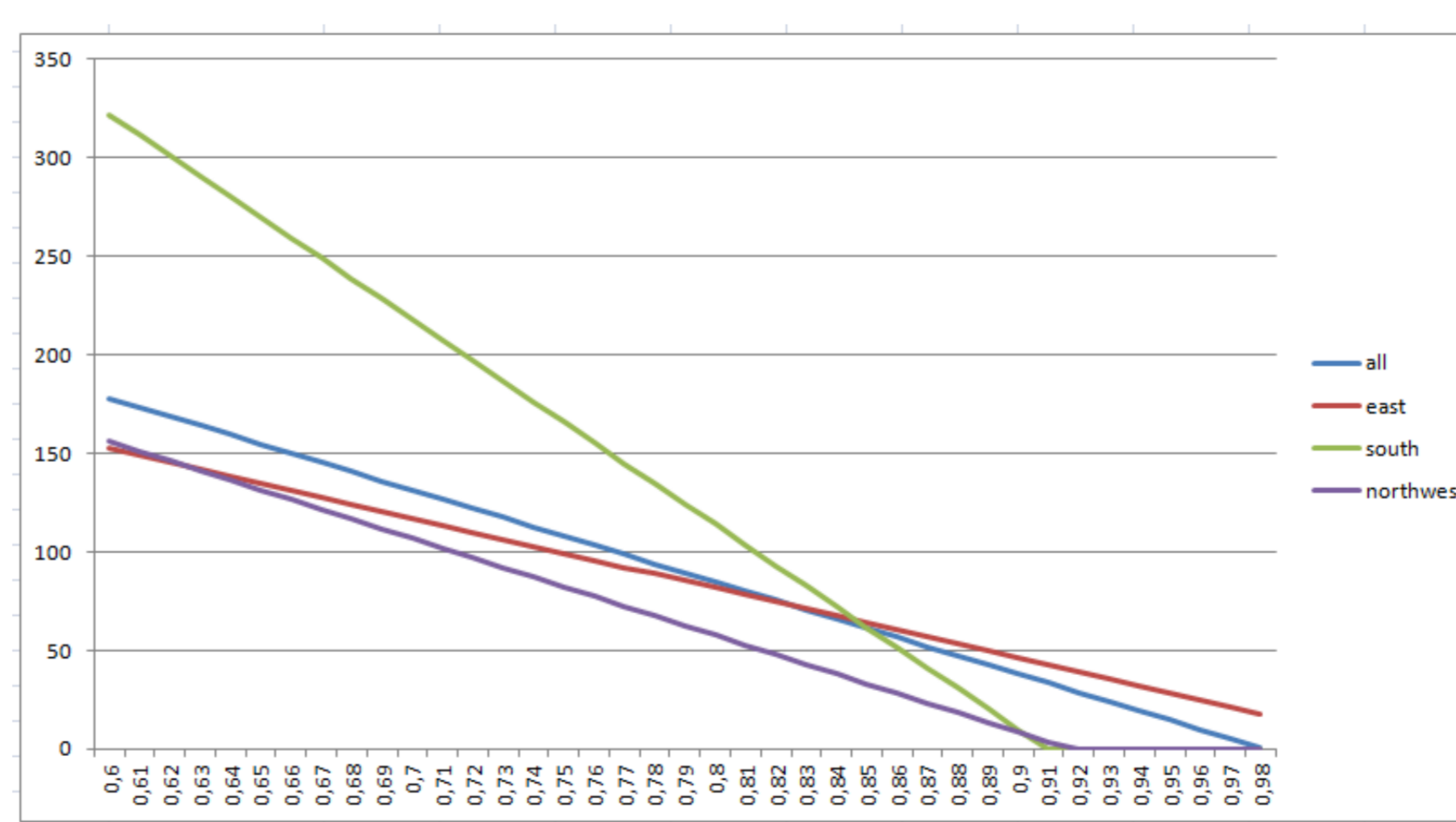
- The sensitivity analysis revealed that the **HDI had the most important effect** in road fatalities compared to the other examined variables.
- Among the three groups, HDI had greater effect on road fatalities in the Southern countries.

Conclusions

- **Economic and social indicators**, such as GDP, HDI, unemployment rate and suicide rates were found to be **statistically associated with road fatalities** in all EU countries.
- Changes in the motorway network and road traffic infringements have different effects on road safety level depending the group of countries.
- The findings of this research might be useful for decisions makers to **identify the expected level of road safety** in a country based on their macroscopic economic and social indicators, allowing thus to identify the separate effect of specific road safety policies, programmes and measures implemented.