Inclement weather effects on road casualty at national level

Methodology and application to a number of European countries

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6th IRTAD Conference
BETTER ROAD SAFETY DATA FOR BETTER SAFETY OUTCOMES
12 October 2017, Marrakech, Morocco

Context and objectives

- Context
  - 2010, atypical mortality in Europe
  - Irtad subgroup Forecasting
- Objectives
  - Catch *inclement* weather effects
  - 7 european countries (AT, BE, DE, FR, NL, SL, UK)
- Method
  - Time-series analysis (UCM) with external (explanatory + intervention) variables
  - Monthly basis, for the long period 1999-2014
- Applications
  - Explanatory analysis over the past 1999-2014 (trend)
  - Forecasting into the future (1 to 6 months)

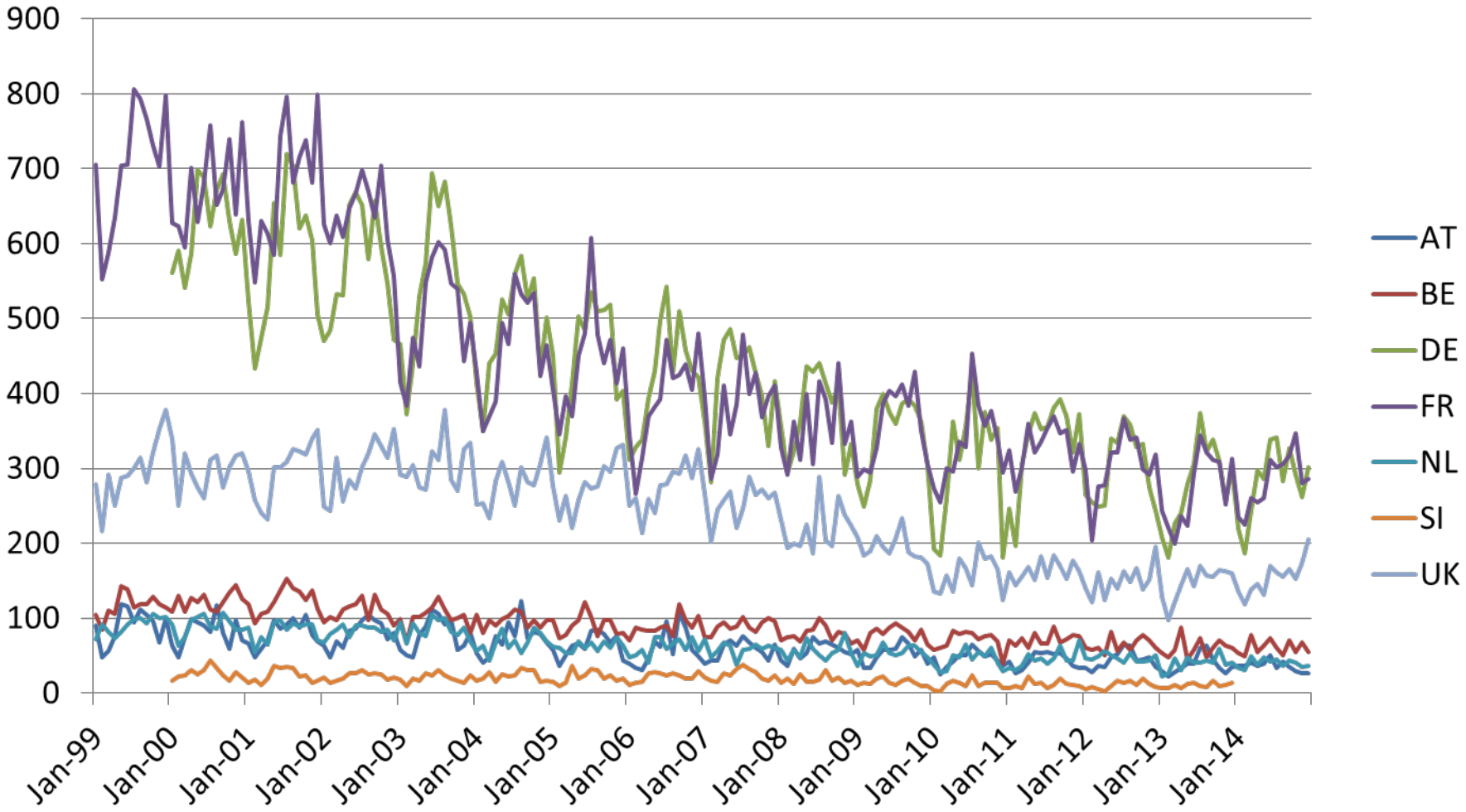
Data

- Casualty data (fatalities and victims)
  - From CARE
- Weather data
  - Extracted and aggregated from Agri4cast
  - 3 inclement weather types of day
    - rain_only
    - rain_cold
    - dry_cold
    - [+ “normal” days]

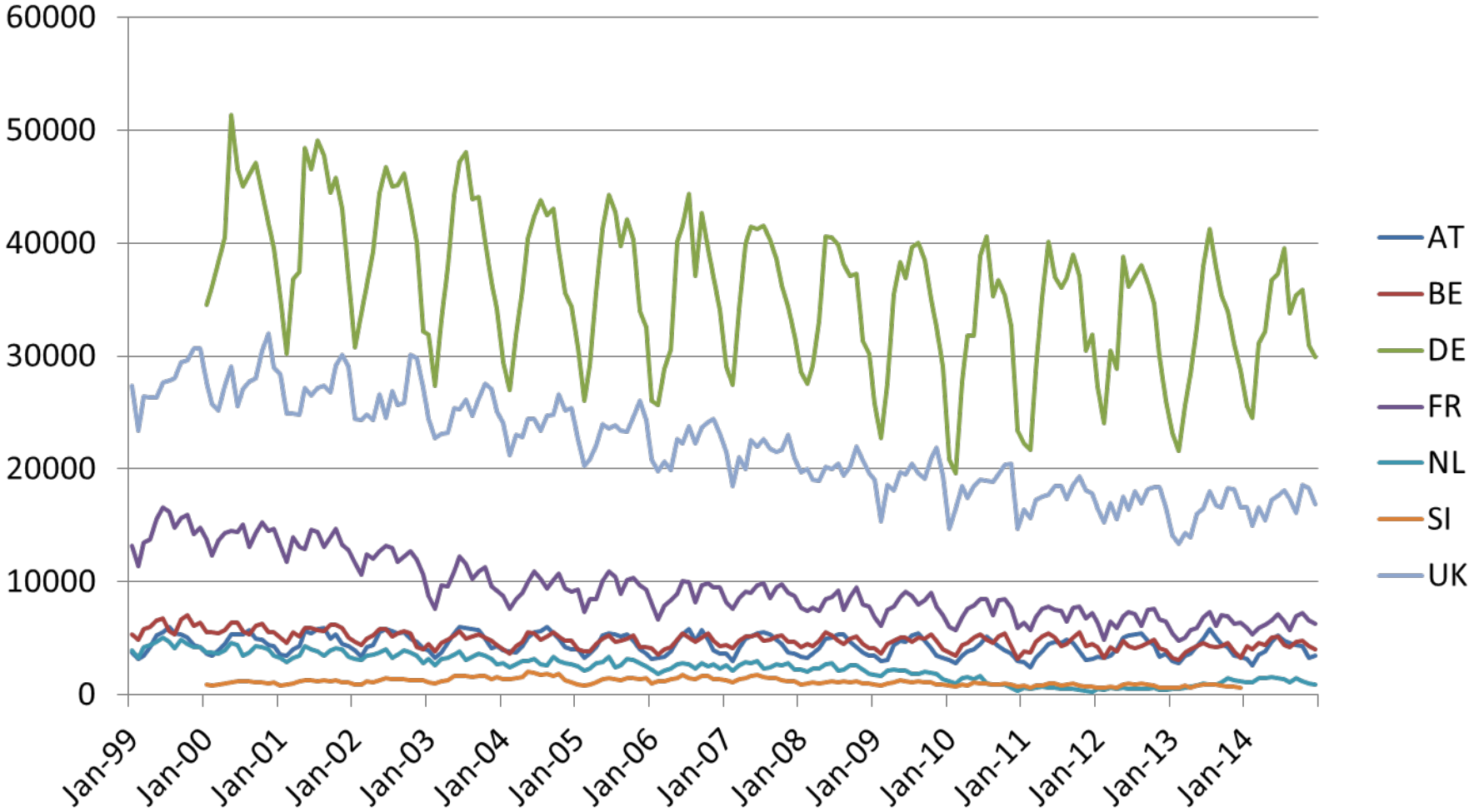
    → Mutually exclusive

Casualty data

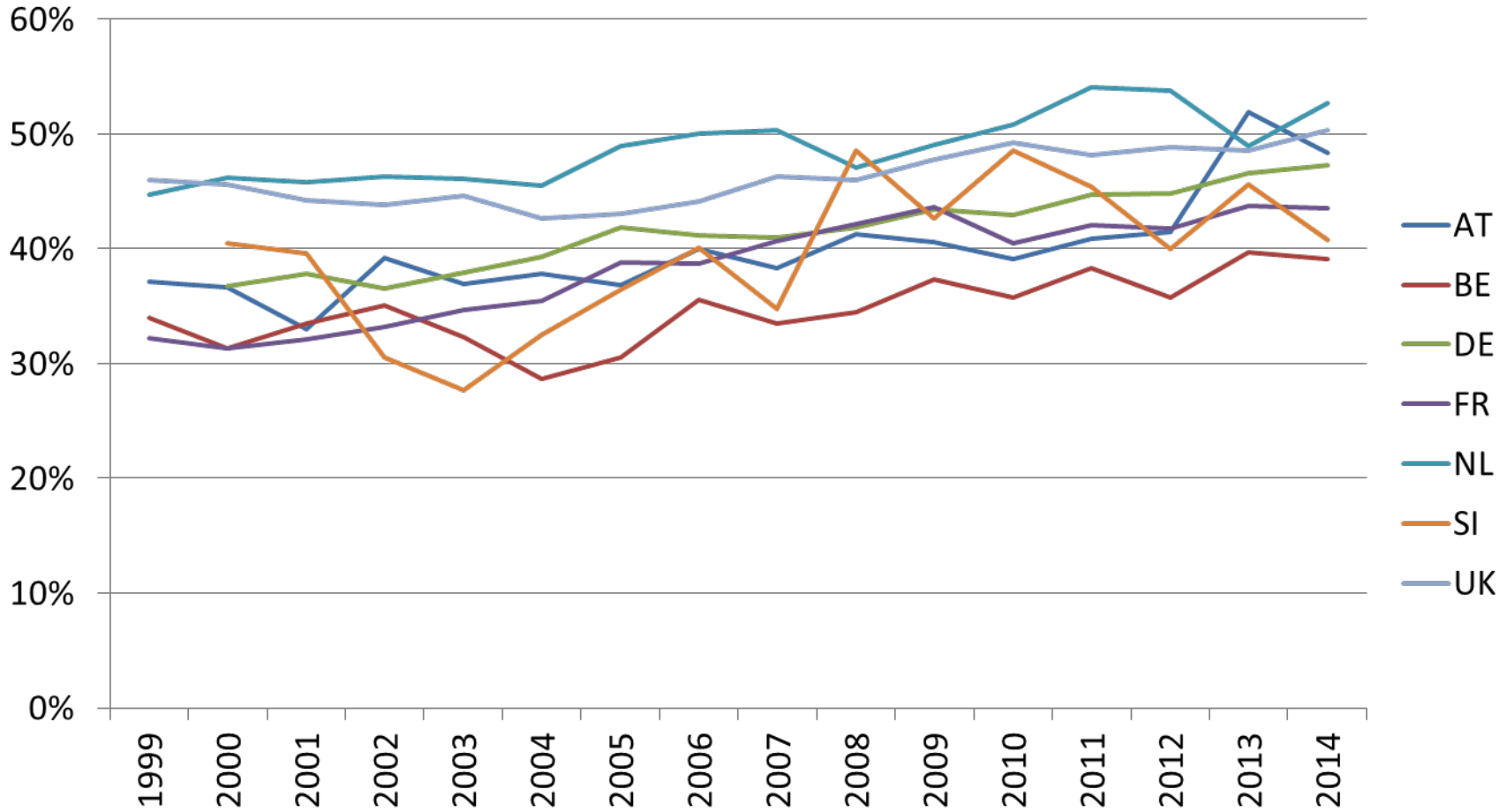
Monthly mortality, Jan 1999 - Dec 2014



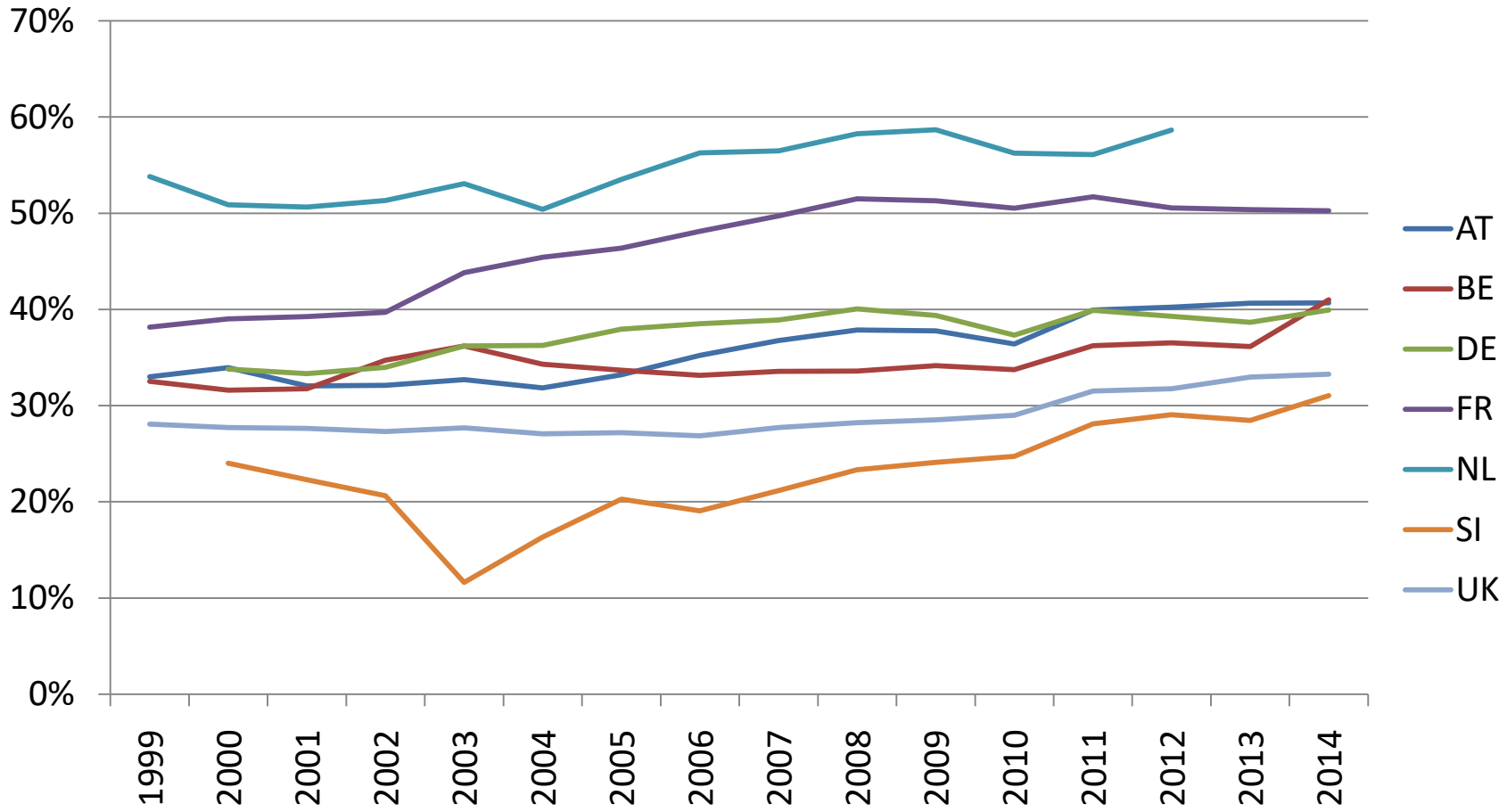
Monthly number of victims, Jan 1999 - Dec 2014



Share of vulnerable road users (pedestrians and two-wheelers) among road fatalities

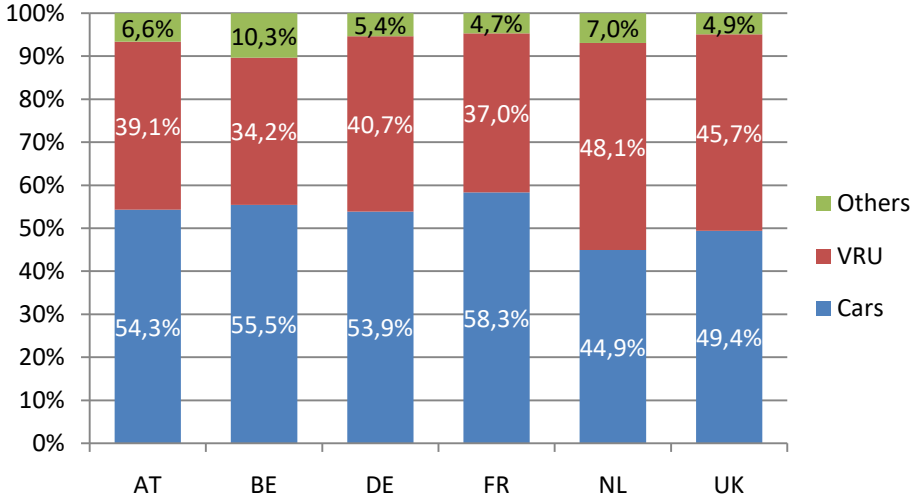


Share of vulnerable road users (pedestrians and two-wheelers) among road victims

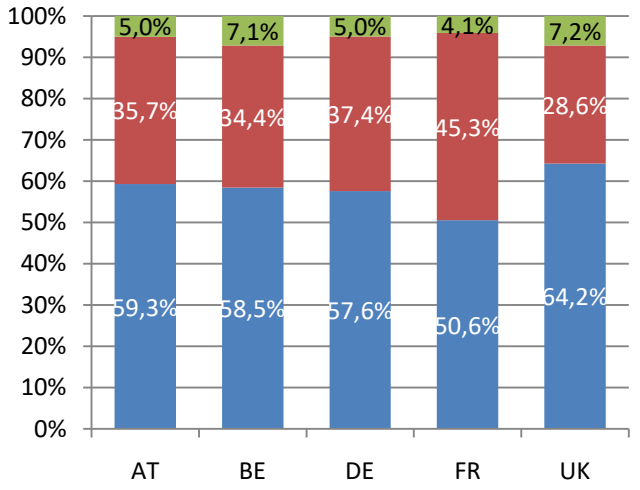


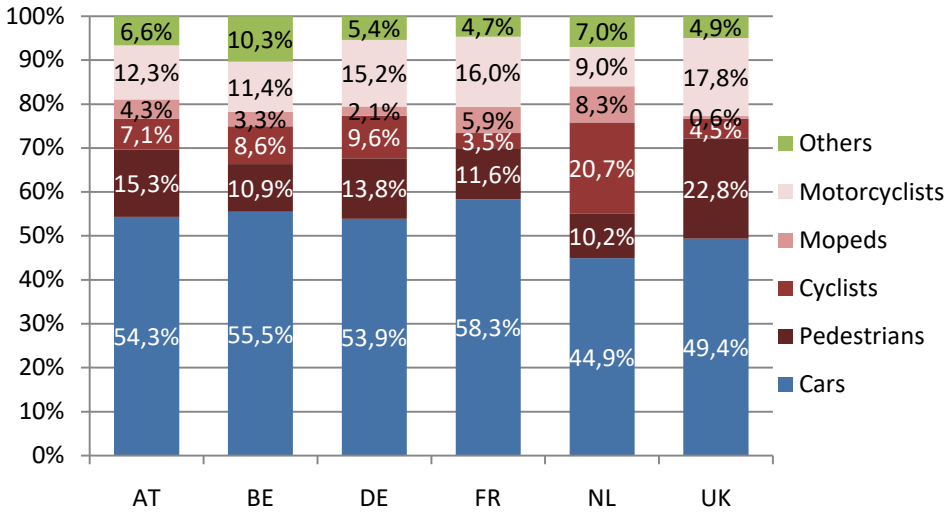
Share of road user types

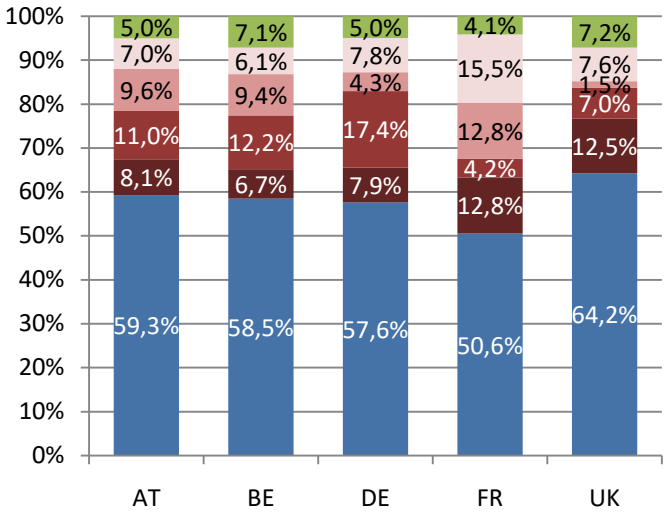
Fatalities



Victims

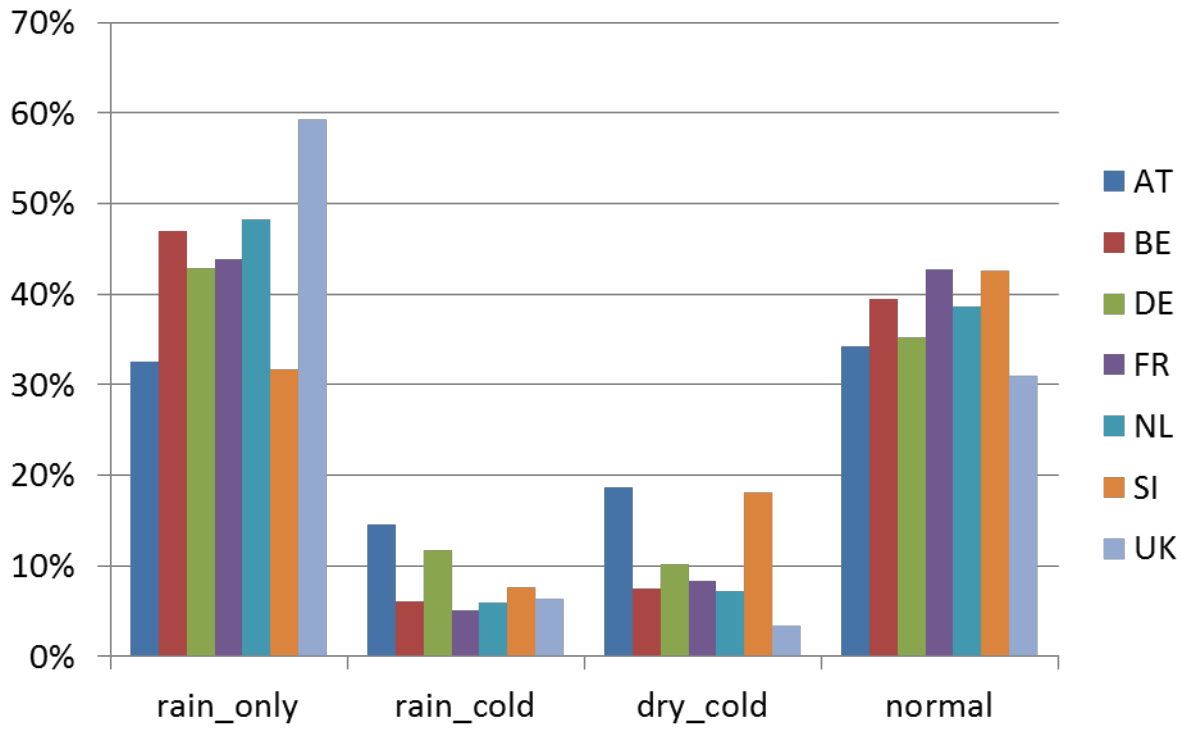




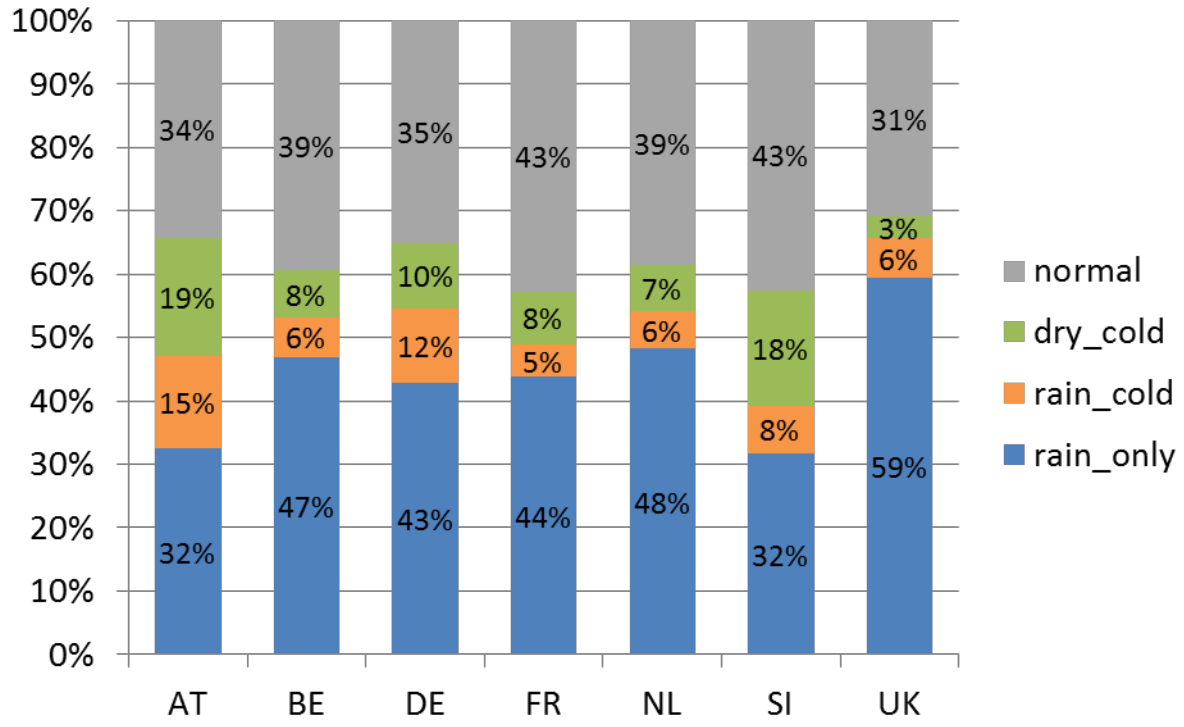


Weather data

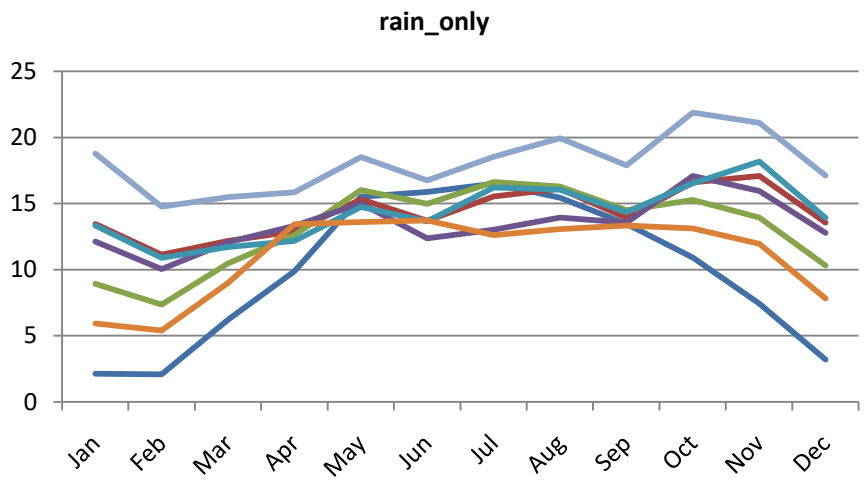
Inclement days – Share (1999-2014) (1)

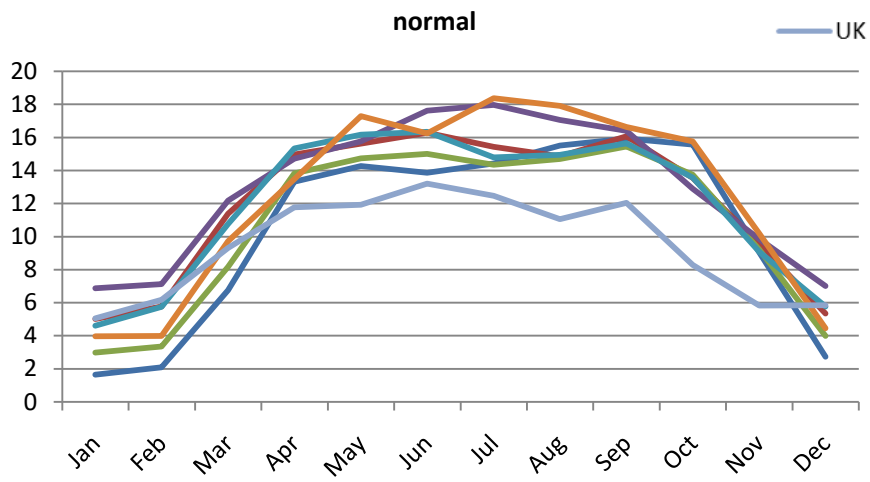


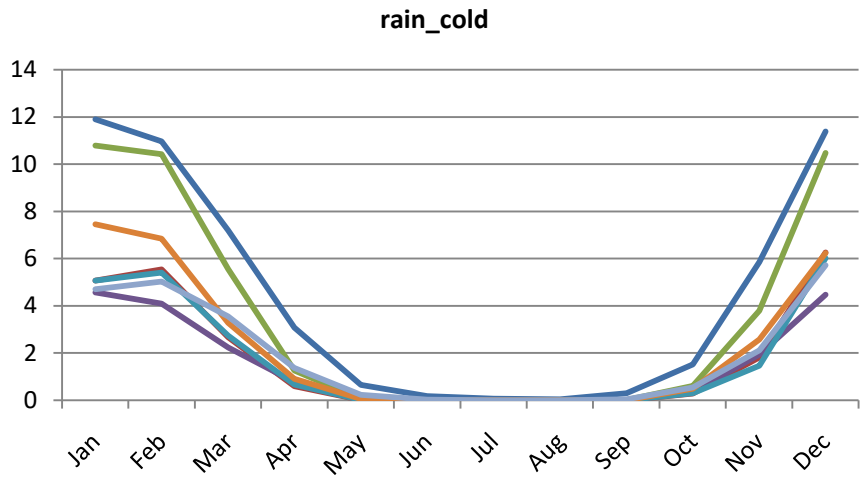
Inclement days – Share (1999-2014) (2)

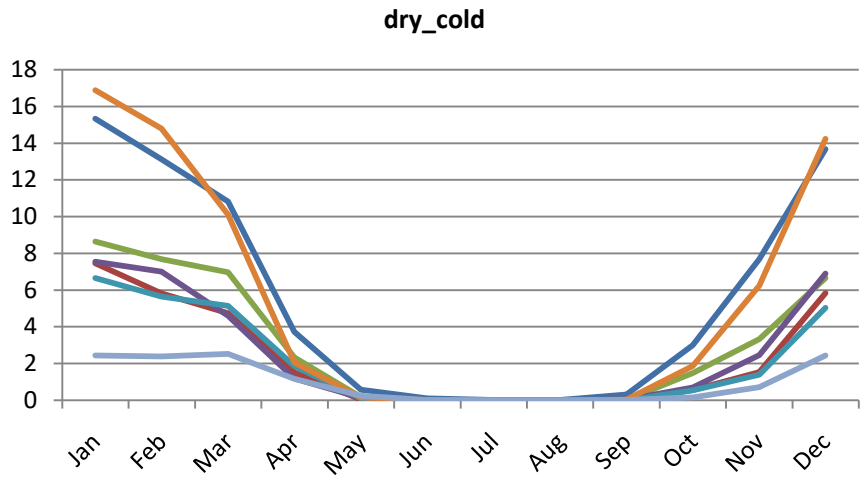


Inclement days – Seasonal average (1999-2014)

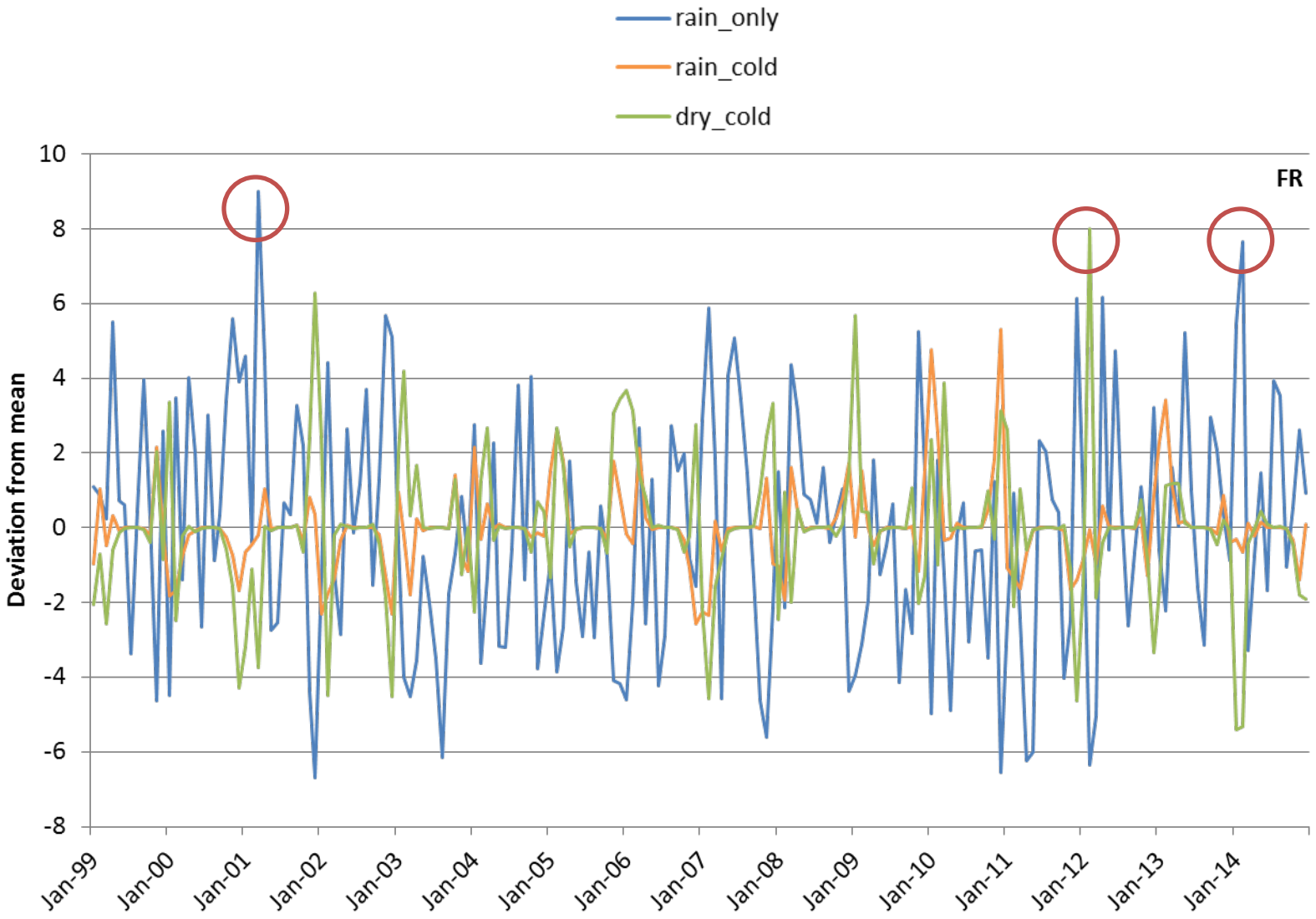








Inclement weather days – Deviation from seasonal average



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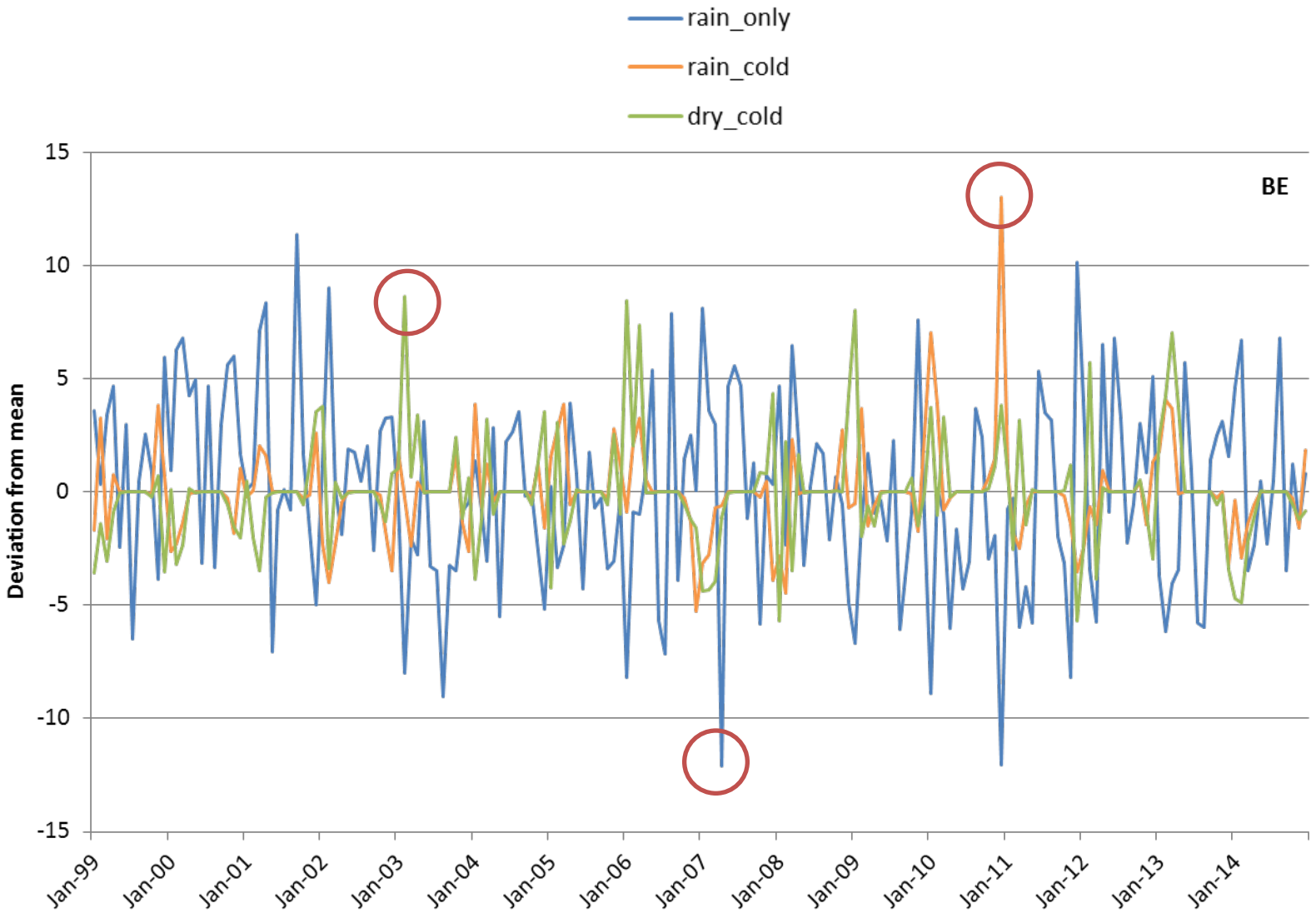
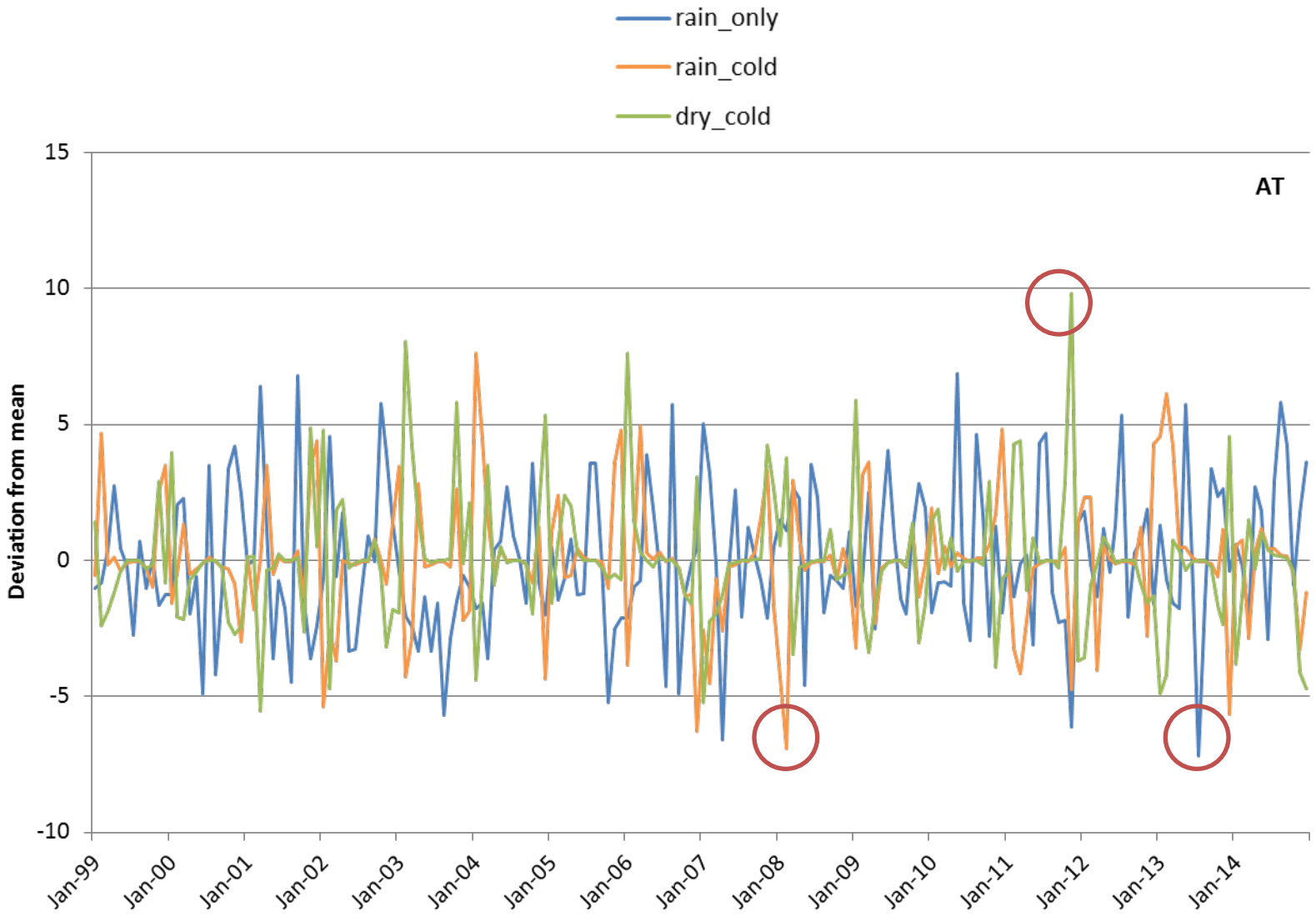
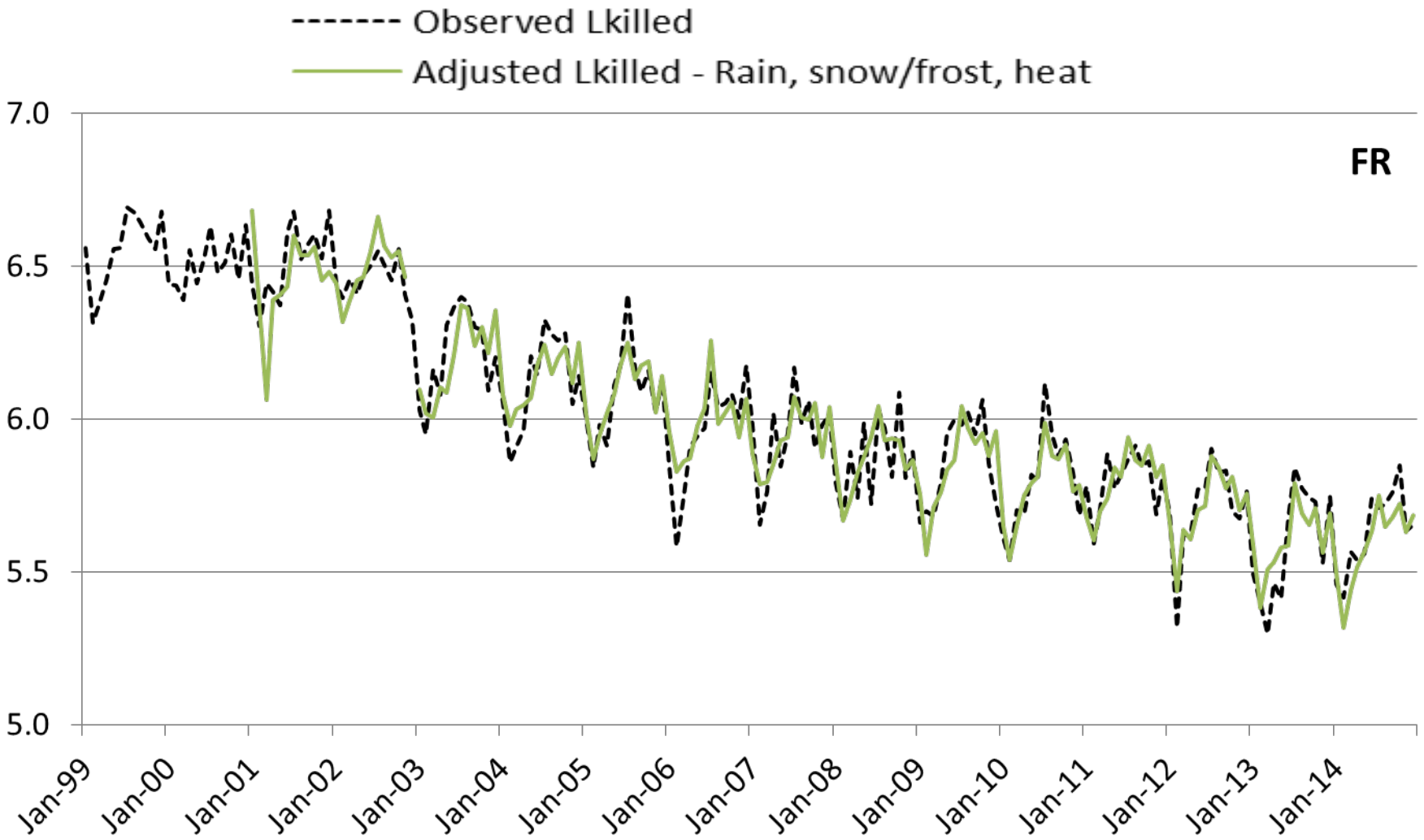


Inclement weather days – Deviation from seasonal average



Results

Monthly mortality in France, Jan 1999 - Dec 2014

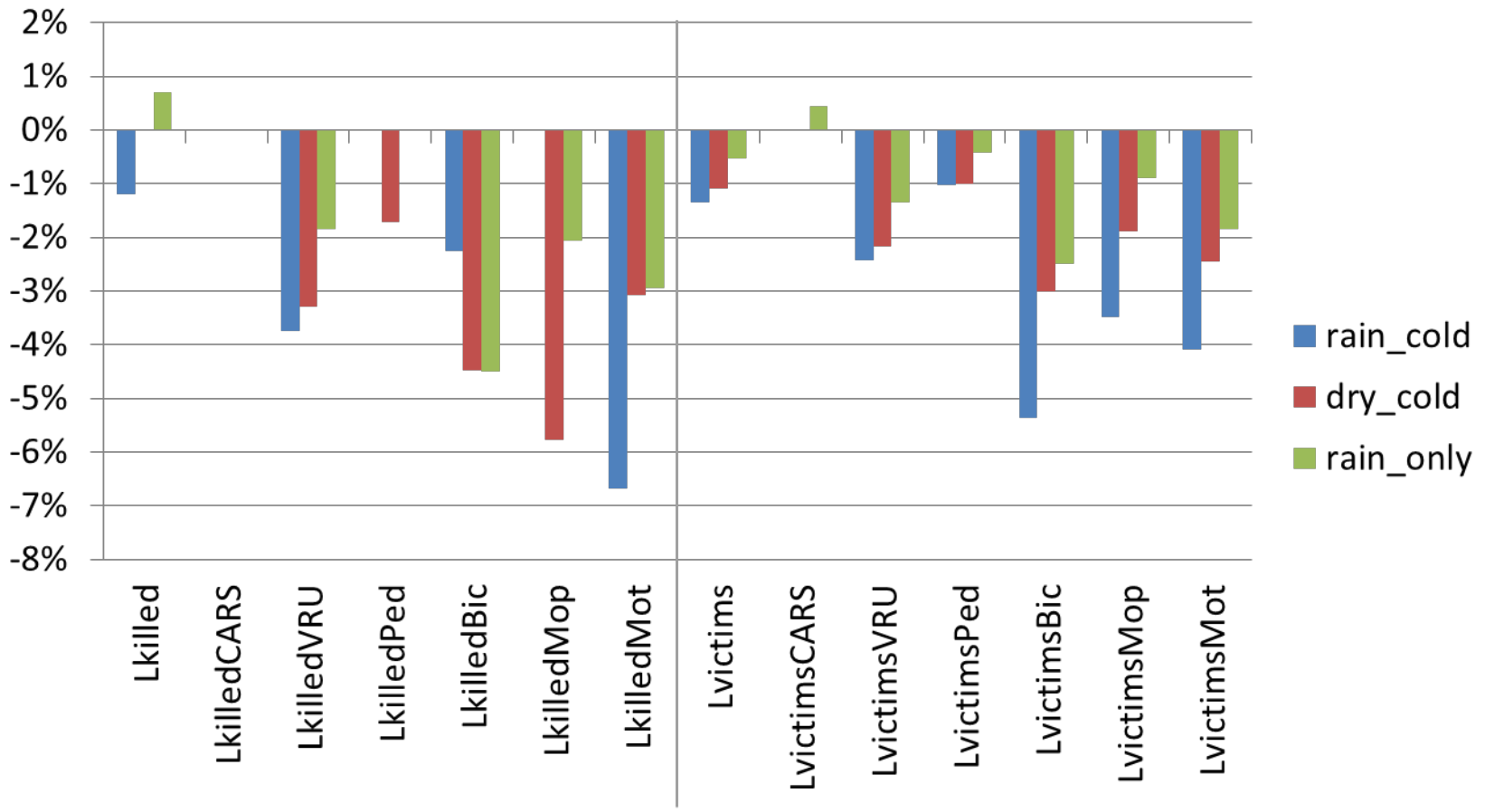


France modelling results

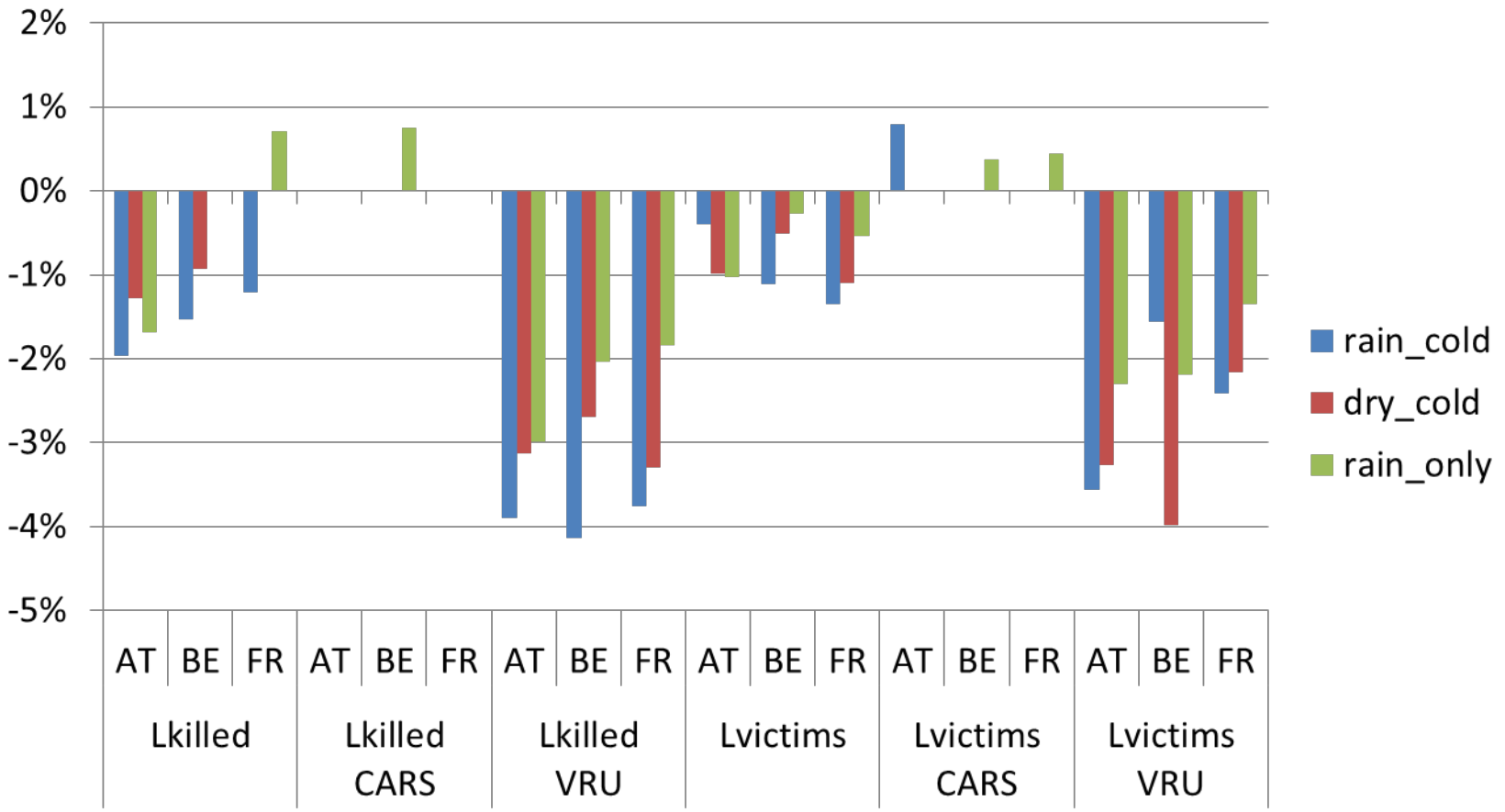
Model	Log-likelihood	rain_cold		dry_cold		rain_only		Slope at last period
		Coeff	P-value	Coeff	P-value	Coeff	P-value	
Lkilled	407.0	-1.21%	0.03	-0.58%	0.06	+0.71%	0.00	-0.0040
LkilledCARS	376.9	-1.07%	0.08	+0.34%	0.43	+0.36%	0.13	-0.0028
LkilledVRU	339.5	-3.75%	0.00	-3.29%	0.00	-1.85%	0.00	-0.0032
LkilledPed	281.6	-1.62%	0.14	-1.72%	0.03	-0.31%	0.49	-0.0019
LkilledBic	168.8	-2.25%	0.01	-4.48%	0.04	-4.51%	0.00	0.0005
LkilledMop	229.1	-0.47%	0.75	-5.77%	0.00	-2.06%	0.00	-0.0046
LkilledMot	268.5	-6.68%	0.00	-3.07%	0.00	-2.94%	0.00	-0.0022
Lvictims	513.8	-1.36%	0.00	-1.10%	0.00	-0.53%	0.00	-0.0032
LvictimsCARS	486.9	-0.60%	0.05	-0.10%	0.63	+0.44%	0.00	-0.0041
LvictimsVRU	489.8	-2.42%	0.00	-2.16%	0.00	-1.35%	0.00	-0.0031
LvictimsPed	437.7	-1.02%	0.01	-1.01%	0.00	-0.42%	0.01	-0.0022
LvictimsBic	404.9	-5.37%	0.00	-3.02%	0.00	-2.49%	0.00	-0.0002
LvictimsMop	465.1	-3.48%	0.00	-1.89%	0.00	-0.89%	0.00	-0.0034
LvictimsMot	442.6	-4.09%	0.00	-2.45%	0.00	-1.84%	0.00	-0.0018

*Significance: ***** $3 < |t|$, **** $2.5 < |t| \leq 3$, *** $1.96 < |t| \leq 2.5$, ** $1 < |t| \leq 1.96$, * $0 \leq |t| \leq 1$*

France modelling results



Country modelling results



In summary

This analysis may serve for assessing road safety trends at an aggregated (regional/national) level, both over the past and into the future:

- For adjusting aggregated mortality/casualty corrected for inclement weather
  - For monitoring the data of the latest 1-3 months
- For forecasting aggregated mortality/casualty corrected for inclement weather
  - For extrapoliting the recent trend into the near future : 1-3 to 6 months ahead

Some more information ?

- Factsheet N° 3 of the IRTAD Forecasting Subgroup

Members of the Subgroup for the duration of this work:

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- **Thank you for your attention !**