



Impact of the economy and COVID-19 on road casualties of Eastern EU countries for the 24 years 2000-2023

¹Kustra Wojciech*, ²Bergel-Hayat, Ruth, ³Wachnicka, Joanna, ⁴Zielinska, Anna, ⁵Zukowska, Joanna,

¹wojciech.kustra@pg.edu.pl, Gdansk University of Technology, Poland

²rbh.conseil.form@gmail.com, RBH-Conseil, France

³joanna.wachnicka@pg.edu.pl, Gdansk University of Technology, Poland

⁴anna.zielinska@its.waw.pl, Motor Transport Institute, Poland

⁵joanna.zukowska@pg.edu.pl, Gdansk University of Technology, Poland

Introduction

The access to the EU for a number of Eastern European countries, from 2004 onwards, opened the way to significant changes in those countries. Central, Southeastern Europe and Baltic European member states joined the EU in 2004, 2007 and 2013: in 2004, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic, and Slovenia; in 2007, Bulgaria, Romania; and in 2013 Croatia - increasing the number of members of the current EU to 27.

Their economies grew rapidly stronger: the vast changes in infrastructure (including road infrastructure), among others, which most of these 11 countries performed with the funds they received from the EU are visible 5 to 20 years later. Consequently, their levels of road safety also increased, and their outputs – the number of injury accidents and casualties – decreased.

This work aims to provide an overview of the relationship between road casualty outputs and a number of economic indicators measured at national level in those countries during the 24 years 2000-2023. In particular, the impact of the COVID-19 crisis will be highlighted in comparison to the impact of the other financial-economic crisis of 2007-2008, which the period included.

Research Methodology

We performed a trend analysis of the numbers of casualties - whether fatalities, severe or slight injuries - measured on an annual basis, and on a monthly basis for those countries with available data. Time-series models were also used on the period 2000-2021 (we excluded the years of war in Ukraine) for capturing the relationship between these dependent variables and a number of independent variables of an economic nature including GDP, Industrial production and Unemployment rate, measured at national level. The data used were extracted from a number of databases including CARE from the EU, IRTAD from the OECD and national databases regarding the dependent variables and Eurostat from the OECD regarding the independent variables.

They are described in more detail in Table 1, Figures 1-2, and their trends over the period are described as follows.

Data

Independent variables. All 11 EU member countries have seen significant benefits throughout the period, as shown by the changes in the variables of economic nature between 2000 and



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2023. In 24 years, there has been a significant increase in real GDP, ranging from 58% in Slovenia (which already in 2000 had a much higher GDP than the other countries) to 183% in Lithuania. This growth has led to the catching up of these countries with the so-called Old Union in terms of GDP PPS, with Bulgaria achieving 64% (up from 47% in 2012) and Czechia and Slovenia achieving 91% of the EU average. Industrial production has increased, ranging from 29.5% in Croatia to 212.7% in Romania. Unemployment rates have decreased, with no country exceeding 7%, and Poland and the Czech Republic having rates as low as 3%. Finally, the access to the EU led to high levels of migration, particularly labour migration, causing a significant population decline. In the last 24 years, 8.4 million inhabitants have disappeared. Only Czechia, Slovenia, and Slovakia experienced a population increase of no more than 7%, while Bulgaria and Latvia saw a population decline exceeding 20%.

Dependent variables.

In 2000, 15,549 people died on the roads across 11 countries, which was almost 30% of all deaths in the EU27. In 2022, this number has dropped to 6,033, but was still accounting for almost 30% of all road deaths in the EU. However, there has been a clear downward trend in all countries. The decrease 2023/2000 ranged from 34% in Romania to 78% in Latvia. Additionally, the number of fatalities per 1 million inhabitants has also improved in all countries. Despite the population diminished, this rate fell, ranging from 38.7% in Slovenia to 81.3% in Bulgaria over the period.

Data on seriously injured people was collected for about all countries for 2012-2023. In most countries, the number of victims in this group decreased over this period, ranging from 4.6% in Croatia to as much as 58.4% in Romania - with the exception of Hungary and Slovenia, where there was a slight increase of 2.0% and 2.2% respectively.

Table 1 Socio-economic variables and road casualties in 11 countries, year 2023

Country	PO [mln in.]	GDP [current €/person]	GDP PPS [%]	IPI15 [-]	UR [%]	FAT _P [fat./1 mln in.]	SIN _P [sin./1 mln in.]
Bulgaria	6.448	7850	64	113.9	4.3	81.3	258.2*
Czechia	10.828	18370	91	114.3	2.6	46.4	161.6
Estonia	1.366	15370	81	115.5	6.4	43.2	303.3*
Croatia	3.851	14750*	76	110.9	6.3	71.2	805.5
Latvia	1.883	13220	71	146.3	6.5	75.4	202.9
Lithuania	2.857	14840	87	117.9	6.9	56.0	169.6*
Hungary	9.600	14370	76	146.3	4.0	55.4*	519.1*
Poland	36.754	14750	80	119.1	2.8	51.5	206.6
Romania	19.055	10250	78	148.3	5.6	85.8*	193.8*
Slovenia	2.117	22090	91	102.1	3.7	38.7	392.1
Slovakia	5.429	16490	73	124.5	5.9	48.9*	159.3*

*data for year 2022, data 2023 is not available

Where: PO – Population, GDP - Real GDP per capita ratio, GDP PPS – average ratio EU GDP in 2022, IPI15 - production in Industry (base 100 in 2015), UR – Unemployment rate, FAT_P - Number of fatalities per 1 mln in., SIN_P - Number of seriously injured per 1 mln in.



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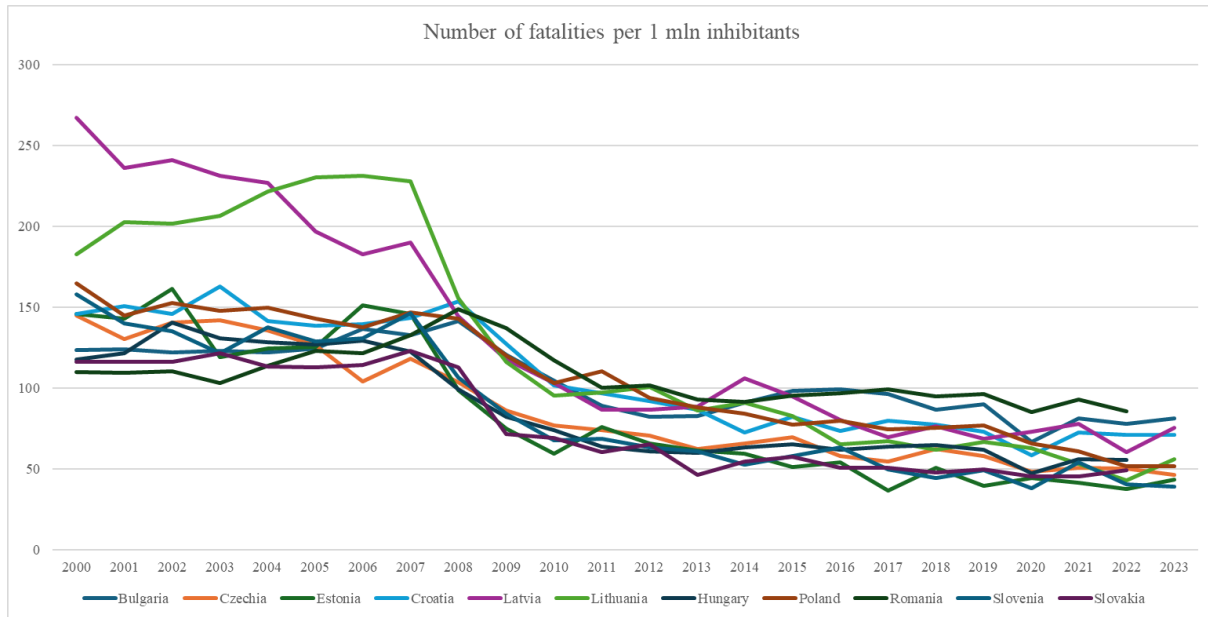


Figure 1 Number of fatalities per 1 mln inhabitants, 2000 - 2023

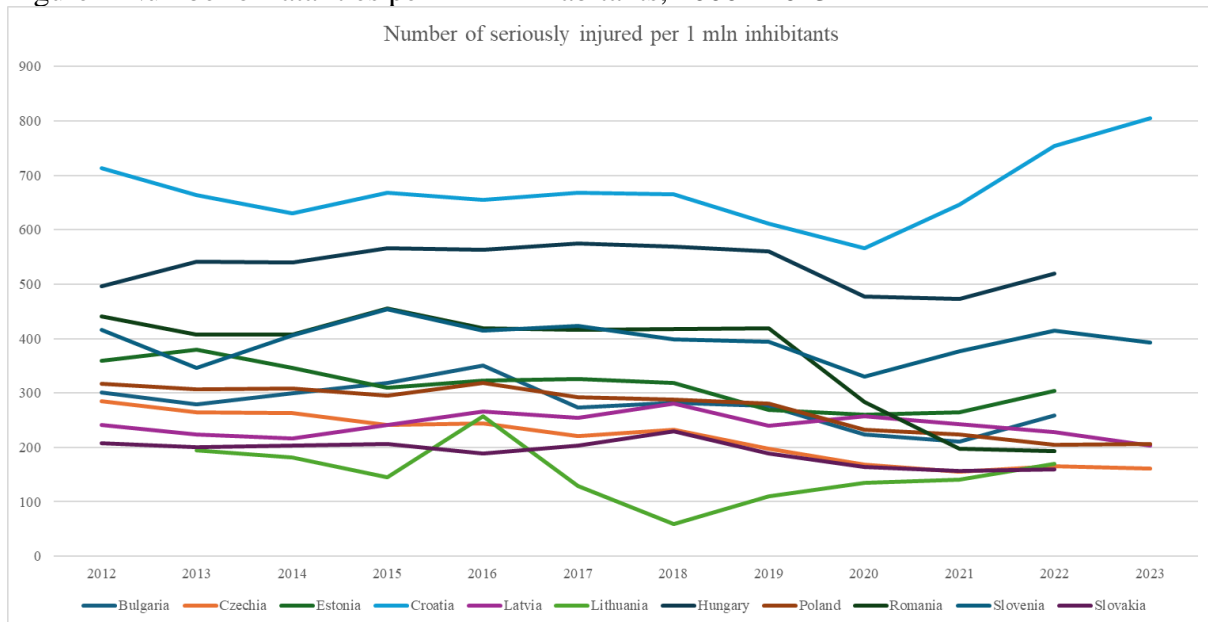


Figure 2 Number of seriously injured per 1 mln inhabitants, 2012-2023

Results and conclusion

As mentioned above, from 2000 until 2023, the numbers of casualties of these 11 countries which joined the EU decreased while a clear strengthening of their economies took place. In addition to the trends' description, time-series modelling was also performed for the period 2000-2021, in order to exclude the two years concerned by the war in Ukraine. The modelling results clearly show that the relationship between casualty outputs and economic indicators can be quantified in an interpretable manner and is similar among countries. Moreover, the impact of the COVID-19 crisis could also be estimated and compared to the impact the relevant crisis of 2007-2008 had on those countries. Finally, the results show that some countries can be grouped according to specific patterns, which opens the way to further analysis and research.