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Road Safety in urban areas in Greece during economy downturn. A before – after comparison.

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Abstract

The deep economic recession in Greece has significant effects on urban lifestyle. Negative economic conditions with serious consequences in everyday life, such as the loss of 25-30% of GDP within five years and an unemployment rate over 25% have impacts on urban mobility. Less expenditure for transportation resulted less cars on the roads, increase of public transport passengers, environmental changes in urban motorways with previous serious pollution and noise problems. At the same time, road fatalities have declined by 45% since 2009, the first year of the crisis, and over 50% since 2004.Since road safety is a crucial factor for the sustainability of urban areas, this paper presents a before - after analysis and compares the characteristics of traffic accidents before and after the financial crisis in urban areas in Greece. The results show that there is a further reduction in accidents due to the recession and the significant decline of kilometers - traveled, but certain categories of users or road types in urban areas continue to have a high accidents risk. In urban areas the reduction of fatalities is almost 10% lower than the reduction in non-urban areas. Ages between 45-64 have significant lower reduction than younger users (ages up to 34 years old) while pedestrian's fatalities in urban areas have a reduction 5% lower than the overall reduction of fatalities. Finally, there is no significant differences between the decline of fatalities between males and females. Results confirm that urban areas are still the higher risk environment for road users, so the end of the recession can lead to a significant deterioration in road safety, if no immediate and effective measures.

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1. Introduction

In Greece the recession period officially started by the end of 2008 but the consequences in everyday life were obvious in 2010. During last 6 years GDP had a dramatic reduction (over 25%), and an extreme increase of unemployment rate (a peak rate of 27.6% in 2013) was the result of the continued austerity measures. The unemployment increased by 132%, from 11.9% in the 1st quarter of 2010 to 27.6% in 1st quarter of 2013. Hellenic Statistical Authority (ELSTAT) reported also a decline in the average monthly household expenditure, from 2,203.55 € in 2009 to 1,509.39 € in 2013, which corresponds to a 31.5% decrease (2013 constant prices). At the same period, gasoline price raised by 50% on average, mostly due to a "new" tax in the start of 2010 as a fiscal measure.

Several publications deal with the relationship between economic and traffic or accident indicators and analyze

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extensively, how economic conditions affect to Vehicle Kilometer Travelled as well as fuel consumption, private car usage and as a result to traffic accidents. The theoretical concept of such a relationship is that recession contributes to less vehicle-kilometers, decrease of recreation mobility, less heavy goods traffic, less speeding and more economical and environment-friendly driving and possibly less risky driving behaviors, as fewer young drivers may afford vehicle ownership and travel (Yannis et al., 2014). In the same study authors analyze the effect of GDP changes on mortality rates and summarize that annual GDP decrease is connected with annual reduction in mortality rates. Lloyde et al. (2015) show that economic recession has a key role in the reduction of road traffic accidents in Great Britain. Antoniou and Yannis (2013) presents prediction models for Greece and Cyprus using proxy indicators such as GDP and fuel consumption and provide quite accurate prediction for the number of fatal accidents during the recession period. Skabardonis and Kopelias (2015) analyzed differences and similarities of road accidents characteristics during recession periods in the USA and Greece and resulted that recession has positive effects in road safety mostly due to less travels, traffic volumes reduction and unemployment. Other factors like fuel price, income and expenses for recreation have also affected in the reduction of travels, speed and eventually in fatal accidents. Also Guangquing et al. (2013), showed that as the price of gasoline increased, so will decrease traffic accidents. Additionally, they make a distinction between urban and rural areas and resulted that the effect is weaker for PDO (property-damage-only) and injury crashes in urban areas than rural. In urban areas, for a 1% increase in gasoline prices, PDO crashes per million VMT decrease by 0.36%, injury crashes per million VMT decrease by 0.11%, and fatal crashes per million VMT decrease by 0.22%.

Another reason of the change in accidents during periods of economic crisis is the changes in users travel patterns, especially in urban areas. In Athens, according to the study of Christoforou and Karlaftis (2011) travel demand patterns follow consumption patterns and reflect a general reduction in urban mobility. So, transport consumption declined because users have to adjust in crisis contest. Traffic data from Greece show also a significant reduction in VKT in Athens Metropolitan Area and its main arterial roads that was up to 35% (Kopelias at al. 2016).

In the EU the number of road fatalities declined by 45% between 2004 and 2013 (ERSO). During the last decade, in Greece there is also a significant reduction in fatal accidents that is over 50% (ELSTAT). Specifically, in 2005 there were recorded 1658 fatalities while in 2014, 795 (-52.1%). At the same period serious injured were 2270 in 2005 and 1016 in 2014 (-55.2%) and slight injured 19778 in 2005 and 13548 in 2014 (-31.5%).

In urban areas there are some differences in accident characteristics in comparison with the non-urban areas. For example accidents of pedestrian and cyclists (some of the vulnerable road users), are in majority occurred in urban areas. This study presents the characteristics of road accidents in urban areas for the last decade in Greece and examines if economic crisis had a significant impact in these accidents based on before-after comparisons. For this purpose two periods, five years each, are considered as before and after crisis periods. The before period is 2005 to 2009 and the after period is 2010 to 2014. For accident data we use mostly Hellenic Statistical Authority and Hellenic Traffic Police reports.

2. Trends in Road Accidents in Greece

In Greece, there was a significant reduction in road accidents and fatalities during the period of 2005 to 2014. Fatal accidents in Greece have been decreasing since 2005 at an annual rate of about 2.5% mostly due to newer and safer vehicles, better driving practices, improvements in highway facilities, new means of enforcement and some efforts on the critical issue of driving education (Kopelias et al., 2016;Nathanail and Adamos, 2013). These actions are implemented in the contextof the Strategic Plans for Road Safety in Greece (2001-2010 and 2011-2020) which are a complete policy tool for several actions in the field of road safety (NTUA, 2011). Specifically, in 2005, there were 1658 fatalities in road accidents and 1456 in 2009, a reduction of 12.2%. However, the reduction of fatalities in the 2009 to 2014 period was 45.4% or 36.2% in a comparison of 5 years period before and after (2005-2009 and 2010-2014), a threefold decrease compared to the period of 2005 to 2009.

An overall consideration of road accidents numbers is shown in Table 1. Last columns show the result of the $\chi 2$ test which is used to compare significant differences in before-after change between each category (row) with the total of the rest categories. As Table 1 presents, the majority of road fatalities are men. Particularly, 81% are male and 19% female while almost the same percentages are occurred in the after period. Before-after decrease is 36% for men and 36.4% for women respectively. Driver fatalities reduction is 35.2% (1025 on average per year before and 665 after). Passengers, dropped by 44.5% with a significant difference ($p<0.01$) comparing their reduction with other categories