

Cost-benefit assessment of the intensification of road safety enforcement in Greece

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Background

- Road accidents and related casualties presented an increasing trend during the past decade in Greece, mainly due to insufficient maintenance of the road network, inappropriate behaviour of the road users and lack of efficient and systematic enforcement
- Since 1998, the Greek Traffic Police started the intensification of road safety enforcement, having set as target the gradual increase of traffic controls for the most important violations:
 - speeding
 - drinking and driving

Basic road safety trends 1998-2003

	1998	1999	2000	2001	2002	5-year change
Injury road accidents	24,819	24,231	23,127	19,710	16,852	-32%
Persons killed	2,182	2,116	2,088	1,895	1,654	-24%
Vehicles (x1000)	4,323	4,690	5,061	5,390	5,741	33%
Speed violations	92,122	97,947	175,075	316,451	418,421	354%
Alcohol violations	13,996	17,665	30,507	49,464	48,947	250%
Alcohol controls	202,161	246,611	365,388	710,998	1,034,502	412%

Objectives

Cost-benefit evaluation of police enforcement for speeding and drinking-and-driving in Greece for the period 1998-2002

- to estimate the magnitude and significance of the safety effect of speed and alcohol enforcement in the examined period
- to estimate the costs related to the implementation of the enforcement scheme
- to exploit existing research in order to accurately estimate the costs of accidents and fatalities in Greece
- to use this data for the calculation of the benefit / cost ratio of speed and alcohol enforcement.

International experience

- Cost-benefit analysis results for road safety enforcement in different countries are very satisfactory for all types of enforcement schemes

Enforcement scheme	Country	B/C ratio range	
Concentrated general enforcement	Israel	3.5	5.0
Tripling stationary speed enforcement	Norway	6.5	
Tripling alcohol and seat belt enforcement	Norway	1.2	3.6
Increasing alcohol controls	Sweden and Norway	1.5	
Increasing speed controls	Sweden and Norway	2.0	8.8
Section automatic speed control on motorways	Austria	5.5	
Red light violations enforcement cameras	Scotland	2.2	
Red light violations enforcement cameras	Sweden	1.7	
Alcohol enforcement + publicity campaign	New Zealand	7.0	
Increased road safety enforcement + publicity campaign	Australia	3.9	7.9
Risky driving enforcement + publicity campaign	Switzerland	20.0	

Source: ROSEBUD (2005)

Methodology and Data

- The standard methodologies for estimating the safety effects of road safety measures and for performing cost-benefit analysis were used in this research
- Data on road accidents and fatalities from the National Statistical Service of Greece
- Data on enforcement (controls, violations etc.) and enforcement costs from the Greek Police
- The results of three recent studies were also exploited
 - calculation of accident economic cost in Greece
 - willingness-to-pay for accident risk reduction in Greece
 - quantification of the safety effect of enforcement and other safety related parameters in Greece.

Police enforcement costs

Data collection

- The necessary information was obtained by means of interviews with Head Officers of the Police
- On the basis of the yearly numbers of violations, the related costs were estimated through typical conversion measures
 - Labour costs
 - % of violations recorded on typical/special days
 - average number of violations per shift on typical/special days
 - % of violations resulting to driver's prosecution on typical/special days
 - number of policemen are involved in one control shift/prosecution
 - hourly rate of a policeman
 - Vehicle costs
 - number of police vehicles is used in each shift/prosecution
 - average total distance travelled for each shift/prosecution
 - Equipment costs
 - Speed guns
 - Alcoholmetres

Police enforcement costs

Results

	1998	1999	2000	2001	2002
Number of speed violations	92,122	97,947	175,075	316,451	418,421
Number of speed enforcement shifts	5,758	6,122	10,942	19,778	26,151
Number of speed prosecutions	2,764	2,938	5,252	9,494	12,553
Number of alcohol violations	13,996	17,665	30,507	49,464	48,947
Number of alcohol enforcement shifts	12,247	15,457	26,694	43,281	42,829
Number of alcohol prosecutions	1,400	1,767	3,051	4,946	4,895
Number of portable speed guns	231	-	-	-	462
Number of in-car radars	31	-	-	-	62
Number of speed guns with tripod	20	-	-	-	39
Number of alcoholmeters	467	-	-	-	934
Shifts Labour Costs (€)	3,240,743	3,884,141	6,774,446	11,350,654	12,416,389
Prosecutions Labour Costs (€)	437,142	494,016	871,810	1,516,193	1,831,970
Total Labour Costs (€)	3,677,885	4,378,157	7,646,256	12,866,846	14,248,358
Shifts Vehicle Costs (€)	17,639	19,972	35,231	61,197	73,717
Prosecutions Vehicle Costs (€)	2,764	2,938	5,252	9,494	12,553
Total Vehicle Costs (€)	20,402	22,910	40,483	70,690	86,270
Total Equipment Costs (€)			164,620		
Total Enforcement Costs (€)			43,222,878		

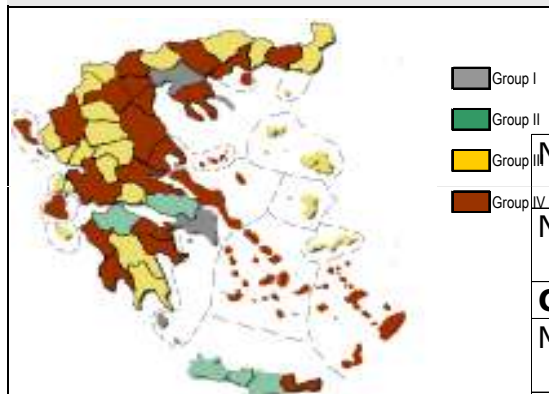
Police enforcement benefits

Methods

- The results of a recent research were exploited: macroscopic investigation of the effect of enforcement on road safety improvement in Greece
 - Cluster analysis of the 52 prefectures of Greece, based on road network, population density, vehicle ownership, traffic violations and accidents
 - 4 clusters identified
 - Poisson regression models for road safety in Greece in relation to enforcement, vehicles fleet, vehicle ownership, population:
 - Models with no time halo effect of enforcement ("conservative" scenario)
 - Models with a time halo effect of enforcement ("best" scenario)

Police enforcement benefits Results

- The effect of enforcement of speeding and drinking-and-driving was found significant only in Groups II and IV



		1998	1999	2000	2001	2002
Number of speed violations	Group II	9,579	16,091	31,533	64,966	82,531
	Group IV	14,648	19,899	30,112	54,164	69,568
Number of alcohol violations	Group II	13,584	19,485	54,498	151,943	213,138
	Group IV	24,967	35,171	60,828	112,066	179,552
Conservative scenario						
Marginal effect speed	Group II	-1.239				
	Group IV	-1.542				
Marginal effect alcohol	Group II	-1.929				
	Group IV	-1.373				
Number of accidents prevented	Group II		19	87	229	140
	Group IV		22	51	107	116
Total accidents prevented		772				
Best scenario						
Marginal effect speed	Group II	-2.224				
	Group IV	-2.053				
Marginal effect alcohol	Group II	-2.265				
	Group IV	-2.684				
Number of accidents prevented	Group II		28	114	295	178
	Group IV		38	90	187	213
Total accidents prevented		1142				

Accidents costs

Material damage and generalised cost

- Recent research results were used based on data collection from National Statistical Service of Greece, National Police, Greek Fire Brigade, Emergency Medical Service of Greece, hospitals, courts, insurance companies etc.
 - Material damage costs
 - Generalized costs
 - Police
 - Fire brigade
 - Insurance companies
 - Court
 - Lost production output
 - Rehabilitation
 - Hospital treatment
 - First aid and transportation)

Accident costs

Human costs

- $VoSL = (NAEIS) / (LSE)$

Where:

- VoSL: Value of Statistical Life for fatalities
 - NAEIS: National Annual Expenditure on Improving Safety
 - LSE: Expected lives Saved from this Expenditure annually
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- Results of a “willingness-to-pay” survey were used
 - Additional parameters included the average members per family in Greece, the proportion of families with an economically active member, the average family annual income in Greece, the population, the life expectancy in Greece and the current and new accident risk
 - In order to estimate the VoSL for serious and slight injuries, an international recommendation was adopted (taken equal to 13% and 1% of the human cost of fatalities respectively)

Accident costs Results

	Cost of Accidents with		
	Killed	Seriously Injured	Slightly Injured
Material Damage cost (€)	28,769	18,175	13,904
Generalised cost (€)	442,467	23,907	6,960
Human cost (VoSL) (€)	866,626	112,661	8,666
Total cost (€)	1,337,862	154,743	29,531
Proportion of casualties	6.5%	11.5%	82.0%
Average accident cost (€)	128,972		

Cost-benefit analysis

- The Benefit/Cost ratio was calculated for the "conservative" scenario and the "best" scenario for the period 1999-2002

	Conservative scenario	Best Scenario
Number of accidents prevented	772	1,142
Average accident cost (€)	128,972	128,972
Present value of benefits (€)	107,980,919	159,681,549
Cost of speed enforcement (€)	14,814,729	
Cost of alcohol enforcement (€)	24,709,862	
Total Enforcement Cost (€)	39,524,591	
Benefit - Cost Ratio	2.73	4.04

Conclusions

- An important safety effect of speed and alcohol enforcement was estimated, although, interestingly, this effect was not uniform nationwide but appeared more intensely in specific regions
- The enforcement scheme appears to be a main reason for the improvement of road safety in Greece in the examined period
- The intensification of speed and alcohol enforcement was found to be very cost-effective, in both scenarios examined, confirming thus existing findings in the literature
- The fact that a long-term and nationwide intensification of enforcement was proved to be cost-effective is an interesting finding, given that usually more concentrated enforcement schemes appear to be more cost-effective

Discussion

- Lack of detailed and accurate data on the specific resources allocated in the intensification of enforcement (no standards to measure police activity and no system of performance indicators for enforcement exist in Greece)
- As far as accidents cost is concerned, no social values of reference are officially published
- The important benefit obtained from the intensification of speed and alcohol enforcement could motivate decision makers towards further improvement of the implementation and monitoring of the enforcement activity
- Eventually, cost-benefit assessment should become a routine procedure in road safety decision making.

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