



A socioeconomic analysis for a green traffic restrictions scheme in Athens

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INTRODUCTION

Considering that the 60% of European citizens live in cities of over 10,000 inhabitants, the environment and the life quality in urban areas are of vital importance. The sustainable mobility has attracted considerable interest by the scientific community and the public policymakers since in addition to economic importance, mobility activities have environmental and social impacts especially in urban centers. **Transport charging policies consist a basic tool for sustainable mobility** while they are increasingly applied in urban centers.

OBJECTIVES

The aim of this work is to **appraise of the socioeconomic impacts until 2035 of a proposed annual charging policy** called Green Car Access Card (GCAC) for the daily access of passenger cars in the city center of Athens with the charging being adjusted according to the Euro class.

METHODOLOGY

A stated preference survey was conducted and a binary logistic model was developed to determine the public acceptability of GCAC. Moreover, a **socioeconomic analysis** was developed to quantify the impact on traffic, road safety, and air pollution until 2035 from GCAC implementation. For the "Do Nothing" and the "GCAC" Scenarios the road casualties, the travel time, the fuel consumption and the transport emissions are estimated and expressed in monetary unites. Finally, taking into account the investment and operational costs as well as the estimated socioeconomic benefits, the Net Present Value (NPV) is estimated to evaluate the economic feasibility of the proposed policy.

DATA COLLECTION

A **questionnaire-based survey** was conducted using stated preference methodology and data from 370 Athenian drivers were utilized. The questionnaire survey included 4 sections. The first section focused on the drivers' travel profile. The second section investigated respondents' environmental awareness. The third section examined a hypothetical scenario of replacing the current car access odd/even restrictions (Small Ring) in the center of Athens with the proposed GCAC policy. Depending on the car's age (1st registration), three (3) GCAC annual costs (low, medium, high) have been set. The driver was asked to answer if she/he is willing to pay the three examined GCAC charges to reduce by 5, 10 or 15 minutes her/his daily typical trip. The fourth section collected information on respondents' demographics characteristics.

RESULTS

The most important benefit is attributed to the **travel time savings**. Regarding road safety, it is observed that for the first years of the policy operation there is a benefit for the society. Regarding environmental benefit, the decrease of the old vehicle fleet commuting and the renewed technological vehicles are going to contribute to tackling climate change and air pollution leading to an economic benefit by 8.60 mil. € until 2035.

Table 1: Socioeconomic Analysis

	Present Value (3%)	2022	2023	2024	2025	...	2030	...	2035
Costs & Benefits									
C1 Investment Cost	-0.51	-0.53	0.00	0.00	0.00	...	0.00	...	0.00
C1.1 Road Signs	-0.05	-0.05	0.00	0.00	0.00	...	0.00	...	0.00
C1.2 Cameras Cost	-0.17	-0.18	0.00	0.00	0.00	...	0.00	...	0.00
C1.3 System Development	-0.29	-0.30	0.00	0.00	0.00	...	0.00	...	0.00
C2 Operational Costs	-5.57	-0.02	-0.54	-0.54	-0.54	...	-0.54	...	-0.54
C2.1 Media, advertising	-0.23	-0.02	-0.02	-0.02	-0.02	...	-0.02	...	-0.02
C2.2 Stickers	-2.07	0.00	-0.20	-0.20	-0.20	...	-0.20	...	-0.20
C2.3 Staff	-0.99	0.00	-0.10	-0.10	-0.10	...	-0.10	...	-0.10
C2.4 Traffic policemen	-0.74	0.00	-0.07	-0.07	-0.07	...	-0.07	...	-0.07
C2.5 Digital Control System	-1.24	0.00	-0.12	-0.12	-0.12	...	-0.12	...	-0.12
C2.6 Cameras maintenance	-0.31	0.00	-0.03	-0.03	-0.03	...	-0.03	...	-0.03
Total Costs	-6.09	-0.55	-0.54	-0.54	-0.54	...	-0.54	...	-0.54
B1 Driver Surplus	481.14	0.00	84.31	53.13	41.33	...	42.00	...	41.48
B1.1 Travel Time	435.52	0.00	80.05	48.79	37.25	...	37.25	...	37.25
B1.2 Fuel Consumption	45.62	0.00	4.26	4.34	4.08	...	4.75	...	4.23
B2 Externalities	96.96	0.00	8.66	8.81	9.11	...	11.77	...	10.19
B2.1 Road Safety	88.36	0.00	7.83	7.97	8.38	...	11.00	...	9.29
B2.2 Environment	8.60	0.00	0.83	0.84	0.74	...	0.77	...	0.90
Total Benefits	543.95	0.00	92.96	61.93	50.45	...	53.77	...	51.67
NPV (3%)	537.86	-0.55	92.43	61.40	49.91	...	53.23	...	51.13

Table 2: Sensitivity Analysis

Social Discount Rate	1%	2%	3%	4%	5%	6%
NPV	615.24	574.70	537.86	504.30	473.68	445.69

CONCLUSIONS

In case of the introduction and implementation of GCAC in the city center of Athens, a significant reduction in road injuries and fatalities and a significant environmental benefit is foreseen until the year 2035. The positive NPV indicates the **socio-economic feasibility** of the implementation of the proposed environmentally linked congestion charging policy over time. Specifically, if the examined policy is implemented in the city center of Athens, it is estimated that the road casualties within the examined area will be reduced by 956 and the transport emissions with the CO₂ emissions being reduced by 162 mil. tons. Finally, even in extreme price changes over the examined time period, the NPV remains positive ensuring the feasibility of the public investment.

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