

Differences among car user groups regarding CO₂ emissions and sensitivity to policy measures

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Abstract

Two field studies revealed large differences among various subgroups in the population of car drivers. Private drivers, commuters, and business drivers differed strongly with respect to current decisions and behaviour which affect CO₂ emissions, and with respect to their sensitivity to various policy instruments. Several promising policy targets were identified: combinations of user groups and behaviours where substantial CO₂ reduction may be achieved. The sensitivity of different car user groups to various policy measures showed whether and how desired behavioral changes may be realised.

1. INTRODUCTION

Motorised traffic contributes to an important extent (app. 15%) to CO₂ emissions. For the major part (app. 10%) passenger cars are responsible for these emissions. The number of cars has almost doubled between 1970 and 1992 from 2.8 to 5.3 million. The annual total number of kilometres driven by these cars has increased from 36 to 86 billion in this period. Decreasing (the negative effects of) car mobility has become a societal priority.

Policy measures with regard to passenger car mobility, may be categorized according to: (1) the behaviour or decision they aim to alter, (2) the (sub)group of drivers they are directed at, and (3) the policy instrument used to achieve the desired change.

1 Type of decisions or behaviour

<u>Decisions</u>	<u>System parameters affected</u>
- car purchase	---> car possession
- type of car	---> car park characteristics
- car use	---> number of kilometres, occupation rate
- timing and routing	---> congestion, road use
- driving behaviour	---> driving speed, driving style

2 Type of car users

- private drivers
- commuters
- business drivers with private car
- business drivers with non-private car (company or leased cars)

3 Type of policy instruments (as distinguished by Vlek and Michon, 1992)

- physical alternatives and (re)arrangements
- regulations and enforcement strategies
- financial and economic strategies
- information and communication strategies
- social support strategies
- institutional and organisational strategies

Differences in current behaviours of the various user groups implicate that measures aimed at altering behaviour may have different potential effects upon various user groups. Moreover, users groups may differ in their sensitivity to various policy measures. For designing policies which will effectively reduce energy use and adverse emissions by passenger cars two steps, taken in two studies, are necessary.

Study 1: who and what? This study focuses on the various types of car users and types of decision or behaviour, distinguished above. The aim of this study is to identify combinations of behaviour type and car user type, where at least in principle substantial CO₂ emission reductions are possible.

Study 2: whether and how? Whether these CO₂ reductions may actually be achieved depends on two factors: personal control and sensitivity to policy instruments. Personal control refers to the extent to which drivers are able to change their decisions and behaviour. Due to eg. infrastructural or organisational factors, the degree of personal control may differ among user groups. The extent to which drivers are sensitive to various types of policy instruments may also differ among the user groups. The aim of study 2 is to determine differences among user groups with regard to personal control over their decisions and behaviour, and their sensitivity to various policy instruments, in order to determine - for each of the 'behaviour and user group' combinations identified in study 1 - whether behavioral changes are possible and how these changes may best be achieved.

2. METHOD

In study 1 a large and representative sample of Dutch car drivers (n=1150) filled in a postal questionnaire in which information was collected about various types of decisions and behaviour, as indicated above. The sample was drawn from car registration files.

In study 2 interviews were held with app. 50 representatives of each user group, in which the degree of personal control over decisions and behaviours and the respondent's sensitivity to different types of policy instruments were assessed. The sample was drawn by observing cars on motorways.

3. RESULTS

The results of study 1 indicate that user groups differ strongly with respect to almost every CO₂ relevant decision or behaviour. For most behavioral parameters, the between-group differences have a similar pattern. *Private drivers* (42% of the total population of car drivers) score less negatively on all CO₂ relevant parameters (except car age). They drive relatively light, old, and fuel-efficient cars. *Private drivers* have the lowest kilometrage. They report to drive more slowly and in a more energy-efficient way than the other groups. Hence, their driving style results in fewer CO₂ emissions per kilometre driven. *Business drivers with non-private car* (8% of the population) score most negatively on all parameters (except car age) and contribute disproportionably to CO₂ emissions: on average, they have the highest kilometrage, they drive heavy cars with a low fuel efficiency, and their speed choice and driving style result in relatively high CO₂ emissions per kilometre driven. The *commuters* (37%) and *business drivers with private car* (13%) fall in between with regard to all CO₂ relevant parameters.

On the basis of these results several promising combinations of user group and type of decision or behaviour with regard to the reduction of CO₂ emissions, were identified (for details see Cavalini, Hendrickx, and Rooijers; 1993).

The results of study 2 reveal that the amount of personal control drivers (perceive to) have varies for the different decisions and behaviours studied. Many respondents report that, even if they would be willing to do so, they would not be able to give up their car, to drive fewer commuting kilometres, and/or to drive fewer business kilometres. With regard to other behaviours (take a smaller car with the next purchase, decrease the number of private kilometres, drive on other times, drive more slowly, and drive more responsibly) the respondents report to have a considerable amount of control. In general, the drivers view that they have less personal control over decisions which, if altered, would have more far reaching consequences, and vice versa.

Moreover, it was found that user groups differ in the amount of control they have over specific decisions or behaviours. For instance, *business drivers* think they have less freedom to give up their car than *private drivers* and *commuters*. Compared to the other groups, fewer *private drivers* could decrease the number of private kilometres. Only a minority of *commuters* could drive on other times, whereas both groups of *business drivers* may have more freedom to do so.

Subjects were asked why it was not possible to change a certain type of decision or behaviour. Three sorts of reasons were given: 1) reasons referring to organisational circumstances or conditions, 2) from the subjects' point of view their behaviour is already 'optimal', and 3) anti-public transport reasons.

With regard to the drivers' sensitivity to the various policy instruments, the results demonstrate the following. In general, *private drivers* and *commuters* are more inclined to change their behaviour than both groups of *business drivers*. All user groups are more willing to change behaviour which does not alter their mobility life style (eg. smaller car, drive slower). Drastic behavioral changes are less likely to occur (eg. give up car, drive less). On average, the drivers are less sensitive to communicative measures (education and information) than to legal, financial, infrastructural, and organisational measures.

As expected, user groups differed with regard to their sensitivity to different policy instruments. For instance, *private drivers* and *commuters* are to a larger extent than the *business drivers*, willing to give up their car, to buy a smaller car, to drive fewer commuting kilometres and to drive on other times. The former groups are more sensitive to infrastructural, organisational, legal, and financial measures than *business drivers*. The difference is largest for financial measures. Especially the *business drivers with non-private car* are not sensitive to this kind of measures. They are more sensitive to infrastructural, organisational, and legal measures. Of all groups, *private drivers* are most sensitive to information measures.

Financial measures appear to be the best type of policy measures to induce people to give up their car and to decrease the number of private or commuting kilometres. Infrastructural and organisational measures may best be used to affect decisions about type of car, drive on other times, and drive more slowly. Legal measures could best be utilised to diminish business kilometres, to induce drivers to drive on other times and to drive more slowly. Information measures may best be used to change routing behaviour of drivers.

4. CONCLUSION

This research project has indicated that segmenting the total car users population into several user groups, and distinguishing various types of decisions or behaviour regarding car mobility, may enable policy makers to design more effective policy programs which intend to decrease (the negative effects of) car mobility.

The first study revealed large differences among user groups with regard to current CO₂ relevant behaviours. Combinations of behaviours and user groups, where in principle substantial CO₂ reductions are possible, were identified. The second study of the project demonstrated that the user groups distinguished differ in the extent to which they are able to change various types of decision or behaviour. This study also showed which policy measures would be effective to induce the desired changes in different user groups.

5. REFERENCES

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