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Disentangling sources of vehicle emissions reduction in France: 2003–2008[☆]



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ABSTRACT

We analyze the evolution of CO₂ emissions of new vehicles sold in France between 2003 and 2008. We investigate in particular the effect of two policies introduced during that time: the energy label requirement, which went into effect in the end of 2005, and a feebate based on CO₂ emissions of new vehicles in 2008. We estimate a flexible model of demand for automobiles that incorporates consumers' heterogeneity and valuation of vehicle CO₂ emissions. Our results show that there has been a shift in preferences towards low-emitting cars. Moreover, the timing of these changes is consistent with the introduction of the two policies. This suggests that the feebate had a crowding-in effect in addition to its price effect. Overall, the change in preferences accounts for 40% of the overall decrease in average CO₂ emissions of new cars in the period.

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1. Introduction

In this paper, we study the evolution of carbon dioxide (CO₂) emissions of new vehicles sold in France over the period 2003–2008. We seek to understand the 13% average decrease in new vehicle CO₂ emissions over this period, from 156 g/km in January 2003 to 136 g in December 2008. In particular, we investigate how people reacted to two French environmental policies that aimed at mitigating CO₂ emissions from automobiles. The first is the implementation, at the end of 2005, of a European directive compelling manufacturers to indicate CO₂ emissions by labeling every car. The second is the January 2008 introduction of a feebate that provides a financial reward for low-CO₂-emitting vehicles (less than 130 g/km) and a penalty for those with the highest emissions (more than 160 g/km).

The first reason for this interest is an environmental concern. Cutting vehicle CO₂ emissions is considered a crucial objective, as the transportation sector accounts for a third of the CO₂ emissions in developed countries. As of April 2014, 19 countries have taxation systems related to vehicle CO₂ emissions.¹ The California Clean Cars Law, introduced by the state of California and followed by 13 other states, is another example. It is unclear yet whether this growing concern for global warming at the societal level translates to the individual one, both in terms of utilities and choices. First, global warming will impact consumers in the long run only. Second, its exact consequences are still uncertain and individuals may not know their own effect on it. Finally, even if it enters into consumers' utility functions, the environment is a public good with a very large number of individuals affecting its quality. Because of the classic free-riding problem, people may not modify their choices, even if global warming and environmental issues are discussed more and more.

The second reason to investigate the effects of these policies is related to the more general issue of how consumers react to public policies. Beyond incentive effects, public policies may influence social preferences, which in turn change individual behaviors. A growing economic literature, either based on theory, experiments or natural experiments, acknowledges the importance of such effects (see, e.g., [Bowles and Polanía-Reyes, 2012](#), for a survey). A famous experiment, conducted by [Gneezy and Rustichini \(2000\)](#), introduced a monetary fine for late-coming parents at day-care centers. Contrary to the expectation, the number of late-coming parents significantly increased and remained higher even after the removal of the penalty. This example shows that, by introducing the fine, the parents durably changed their behavior through non-standard channels. Public policies may also modify the information set of bounded rational consumers, affecting their choices in turn. One goal of the paper is to investigate whether such effects are at stake here, and, if so, to assess their importance with respect to more standard price and supply-side effects. Note that we do not investigate precisely which channel the

¹ See European Automobile Manufacturers Association (ACEA): "http://www.acea.be/uploads/publications/CO_2_Tax_overview_2014.pdf".

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