When should urban roads be removed to lower carbon emissions?*

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Abstract

The public debate about the removal of roads in a city shows extreme positions, each party suggesting that the choices are obvious. Some argue that climate issues justify a major reform of the organization of cities. Others observe that the corresponding roads are widely used and that their removal surely comes at high cost. However, the road paradoxes suggest that the problem is more complex. In this sense, one might wonder to what extent should the road supply be reduced. In this paper, we develop a theoretical model aiming at providing a framework for determining the cases in which the removal of express roads may be justified in the context of cities *decarbonization*. In addition to the possibilities of mode switch and the scarcity of public space, its specificity is based on the introduction of two groups of users: the "captives" of the car (or inelastic car-commuters) who do not have access to alternative solutions, and the "non-captives" (elastic car-commuters) who can switch to other modes of transport (public transport or new alternative modes). By introducing pollution externalities in the model, we show that in some cases, a marginal reduction in the road supply can increase the welfare cost. As such, the idea of a drastic adjustment is at the heart of the model.

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1 Estimation: The Case of Paris

1.1 Congestion Parameter

We suppose a linear cost of road usage of the type: $\theta(y, n) = b\frac{yQ}{n}$. b represents the relationship between traffic and travel time. To estimate b, we select the main west-east roads in Paris. These roads link residential areas to the business central district and are of very heavily used.

References