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SOCIAL INTERACTIONS AND SOCIAL LEARNING IN TRANSPORTATION BEHAVIOUR

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Summary

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About the author

Prof. Frank Goetzke is Associate Professor in the Urban and Public Affairs Department at the University of Louisville, where he teaches economics and transportation policy. His main research interests concern modeling automobile ownership and mode choice decision making, with a focus on social learning and neighborhood spillovers, and on how transportation behavior impacts fuel consumption, climate change, public policy and politics. Prior to earning his Ph.D. in Economics (West Virginia University, 2006), he worked for many years as a transportation analyst both for a public agency (CTPS, Boston) and in consulting (Cambridge Systematics). He holds an M.A. in Energy and Environmental Studies (Boston University, 1996) and a B.A. in Political Science and Biology (University of Bremen, 1991). In 2008 and 2010/11, Frank had been a visiting researcher in the division "Regions, Environment and Transportation" at the IFO Institute. Currently he is organizing the 2013 International Workshop "Frontiers in Transportation – Social Interactions" to be held this summer in Munich.

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Abstract

SOCIAL INTERACTIONS AND SOCIAL LEARNING IN TRANSPORTATION BEHAVIOUR

Climate change policies for transportation traditionally focus on demand management and technology. Infrastructure and the built environment also play a decisive role in policymaking, especially at the city level. Surprisingly, however, the interactions between behavioural and social factors have never been systematically analysed as a contributing factor to climate change mitigation in urban transportation. The hypotheses put forward in this paper correct that oversight by showing how social interactions and social learning can induce a modal shift and co-occurring mitigation effects in urban settings. The findings of the research discussed below provide important insights for policymakers.

Groups and societies tend to have more than one social equilibrium. For example at the group level, employees at an office can be hard-working or shirking, students in a classroom can be courteous or bullying, citizens of a community can be honest or deceiving, and members of an organisation can be cooperating or free-riding. We typically call this 'group culture'. Alternatively, at a societal level, we see political engagement or apathy, civil pride or resignation, revolution or suppression. One would think these outcomes are distinctly different from each other, but they are much more closely linked than we may expect. An office environment can slip from hard-working to shirking, or a classroom can overcome bullying in favour of courtesy, etc., and the same is true with societies as well, as can be seen in the collapse of the Eastern-European socialist countries in 1989/90. Previous groundbreaking research such as the broken window theory (Wilson and Kelly 1982) or concerning tipping points (Gladwell 2000) has analysed these empirical facts, which are a result of what we will call social interaction (or spillover) effects (Manski 1993, 2000; Brock and Durlauf 2001, 2002).

This paper addresses the issue of social spillover/interaction effects in transportation, where they do play a central role, as can be seen in the following examples: In strikingly very similar neighbourhoods, people either walk or do not walk, and the physical environment does not seem to be able to explain the different outcomes. Comparing somewhat compatible cities in terms of urban density, infrastructure and the general way of life, one city has a strong biking culture (Amsterdam 38%) and the other one does not (Rotterdam just 14%), or, while for public transit infrastructure investment may be a function of transit culture, one city has high ridership (i.e Naples 26%), and, again, the other does not (Turin 5%).

Research shows that social spillover/interaction effects will lead to multiple equilibria (Goetzke 2006, Dugundji 2013), because people influence each other. If many people bike, then people are influenced by others, causing biking behaviour to spill over to the non-bikers, with the result that they will pick up biking (Radlhauptstadt München/Biking Capital Munich campaign). On the other hand, if a lot of people give up riding transit and drive a car instead, then the remaining transit riders will be influenced by the ones who have fled transit, and ridership will ultimately collapse (United States 1950 – 1990).

Social interaction/spillover effects should be considered an essential ingredient in thinking about transportation policy because multiple equilibria exist in transportation, which causes a high level of fluidity between the equilibria as a consequence of small behavioural changes. Empirical research has found that for recreational biking in Germany, social spillover/interaction effects have a relatively higher impact than weather, topography or even bicycle infrastructure and travel distance (Goetzke and Rave 2011), and for New York, that car owner-

ship is highly influenced by ambient automobile share (Goetzke and Weinberger 2012), resulting in a 10% reduction of vehicles in the neighbourhood. This effect on individual car ownership is equivalent to the effect on a household if it falls one income category (i.e. from high to middle or from middle to low). Furthermore, it has been shown for public transportation in New York city that a 10% increase in the peer's transit use is equivalent to a 5 minute reduction in travel time (Goetzke 2008), and, in a similar study for Amsterdam, that these social spillover/interaction time effects are even twice as large for transit (compared to New York), but for biking the magnitude was similar to the New York transit values (Walker et al. 2011).

Social learning is an extension of the social interaction concept. Social learning can be conventionalised as spillovers over time, meaning that what people have learnt in the past, either based on their own experience or as a result of social interactions, influences their present and future behaviour. Understanding social learning in transportation is extremely important for policymakers because, for example, if children are driven to school then they are more likely to use the car in their adulthood, and vice versa. If they are encouraged to use a bike, they will continue to do so. Weinberger and Goetzke (2010) found that, as a result of social learning, automobile ownership in major metropolitan areas in the United States with access to rail transit is much lower for households who moved from another transit-robust metropolitan area (the measured effect is equivalent to a lower household income of approximately $100,000). In a different forthcoming study, the same authors found that former transit-city residents are also significantly more likely than average to walk and bike (by about 10%).

These examples demonstrate that social interaction and learning effects are empirically significant and policy-relevant. The key point from these findings is that small policy changes can have surprising results, sometimes leading to disastrous unseen consequences, or alternatively, allowing for great possibilities through little investment. On the negative side, a small detrimental change in the walking, biking or transit infrastructure could move a high alternate-mode equilibrium to a new one, which leads to much more car-dependency. On the other hand, even minimal policy interventions in support of non-automotive modes could potentially have major impacts on mode share. For example, Munich's "Radlhauptstadt" (Biking Capital) campaign led in a very brief time period to an almost doubling of the cycling share (now standing at 17%), without much infrastructure change. Similarly, Paris' bicycle-sharing program improved the attitudes towards biking tremendously (increasing cycling by 2 ½ fold in about five years - granted, however, from a very low base). Investment in Berlin's S-Bahn (heavy rail) infrastructure, which increased service by a little less than 50% from approx. 170 km in 1991 to 260 km today, more than doubled ridership (from under 200 Mio. annually in 1991 to about 400 Mio. today).

These fundamental insights about social interactions and social learning suggest that urban policies that simultaneously provide low-carbon modal infrastructure (walkable environment; safe and fast bicycle tracks; dense public transit) and a campaign for adoption of these modes can achieve modal shifts that are higher than expected. The infrastructures are the necessary condition, and campaigning to trigger social interaction and social learning will leverage their full potential. Equally significant is the insight that even minor defunding of any non-automotive modes could lead to unintended catastrophic outcomes - up to a total collapse of the mode. European policy programs supporting a change of the modal split towards cycling and walking can hence potentially be a very effective and low-cost solution for climate change mitigation and other urban sustainability benefits.