THE IMPACT OF CAR AVAILABILITY ON URBAN TRANSPORTATION BEHAVIOR*

JOSEPH BERECHMAN
and
ROBERT E. PAASWELL

Urban Studies Group, Department of Civil Engineering, State University of New York at Buffalo, Buffalo, New York 14214

ABSTRACT

Travel demand estimates that derive from the traditional sequential process often derive their values from some consideration of household car ownership. This variable may be misleading in that not all who live in households with cars may have access to a car; conversely, not all in households without cars are captive solely to other modes.

It is proposed that another variable, car availability, be used in planning studies, to provide more accurately a description of an individual's access to a car. In a recent study, this variable took a two-dimensional form. One dimension considers how the car is available (driver, rider, or not at all) and the other describes the frequency with which it is available (from always to never). From this description, it is noted that a small percentage of people in car owning households have little access to cars, while a significantly high percentage of those in autoless households do have access to cars a great deal of the time (albeit as passengers only).

The constrictions of availability affect the frequency with which someone will do a set of activities, and the mode by which he travels to his activities. Distinctions are shown to exist between car owners, non-car owners, those to whom a car is available and those to whom it is not, using activity frequency as a discriminator. It is seen that as car becomes less available a greater percentage of trips are used for fewer activities. Further as car becomes less available the selection of modes for these activities becomes more apparent. Car is used exclusively for a few selected purposes, then there are trade-offs to bus and walking depending on both car availability and trip purpose. No group then can be thought of as singularly transit captive. Comparisons are made between levels of availability and also between availability and ownership.

* The work reported here was sponsored by the United States Department of Transportation (Contract DOT-OS-30098) and the Greater Buffalo Development Foundation. The views expressed are those of the authors and do not necessarily reflect those of the sponsors. Sue Knapp and Peter Edelstein assisted with the data analysis.
Introduction

Travel studies traditionally treat individual or household car ownership as the sole measure of access to a car which in turn is used as an indicator for the ability of a household to undertake trips of certain defined types (by purpose, by mode, length, etc.) [1]. Repeated application of this criterion to urban travel data tends to produce results suggesting that lack of a car through non-ownership is a major obstacle to individual mobility. Furthermore, lack of car ownership is viewed as influencing both the selection of alternative available modes and the ultimate destination for a particular activity.

The objective of this paper is to introduce a more representative measure for access to a car — car availability. It will be argued that this variable measures access to a car more accurately and consequently better explains variations in trip behavior.

Application of this criterion to data obtained from a study on access to transportation [2] shows that car availability as compared to the binary variable, car ownership, is a powerful yardstick for segmenting trip makers with regard to their daily trip behavior. Furthermore, it shows that given a set of specified activities, mode choice is sensitive to a defined level of car availability. This level of availability can vary from always to never and can represent to the individual traveler a truer picture of mode choice than the simple choice of owning or not owning a car.

Defining Car Availability

As noted at the outset, car availability is distinguished from car ownership [3]. To illustrate this, consider a household which owns one auto used primarily by the breadwinner for home–work trips. Once the car is at the workplace, other family members are carless for a substantial period and are forced to adjust their trip behavior accordingly. On the other hand, an individual who does not own a car but who rides his neighbor's car on home–work trips, has a certain degree of access to a car which in turn affects his daily trip behavior.

Traditional trip generation models at the aggregate level have always used with some degree of accuracy the household level for the unit of analysis. Hence, when zonal averages are obtained and integrated over household characteristics, such as car ownership, availability to the individual seems irrelevant. For our examples above, where the car is at work all day and shopping must be done at night, the household will generate “a” shopping trips. For the second household, “a” shopping trips are also generated, and also by car. (In aggregating for the zone, a source of error can be introduced if the trips by car are assigned only to car owning households.)