mobil.TUM 2024 – The Future of Mobility and Urban Space, April 10-12, 2024

Who buys housing with good public transport? Exploring residential mobility with house transaction data

Erik Lunke [a] [*], Lars Böcker[a]

[a]Institute of Transport Economics, Norway

Keywords: *Public transport accessibility, residential mobility, transport equity*

This work addresses the following topic(s) from the Call for Contributions:
(Please check at least one box)

☐ Placemaking to integrate urban spaces and mobility
☒ Promoting sustainable mobility choices in metropolitan regions
☐ Governing responsible mobility innovations
☒ Shaping the transition towards mobility justice
☐ System analysis, design, and evaluation
☐ other: _____

Extended Abstract

From here 700-1000 words, grouped by the following sections:

Problem statement
Access to public transport (PT) is an essential asset for households in urban region. This is especially the case as cities seek to transition towards more sustainable mobility patterns with lower car use. In this context, having access to high quality public transport becomes important to conduct daily activities and access urban opportunities without the use of car. With poor access to public transport, households are more dependent on car use, and thus also more vulnerable to the increasing cost of car use, such as toll roads and parking restrictions.

A household's level of PT access is directly related to their residential location, which in turn is affected by the characteristics of the housing market. With increasing house prices in central areas, dwellings that are associated with good PT access become more expensive. Previous research has documented that gentrification, and the increasing attractiveness of central areas can lead to processes of suburbanization of poverty (Hochstenbach and Musterd, 2018), which in turn can result in a suburbanization of *transport* poverty (Allen and Farber, 2021) and implications for transport equity and inequality (Banister, 2018; Lucas et al., 2016).

Research objectives
The objective of this study is to explore which households purchase housing with high and low levels of PT accessibility, and how differences in achieved PT accessibility vary with income level. We aim to answer the following research question: *How does the influence of PT accessibility on the likelihood of dwelling acquisition vary with households' income level and stage in the life course?*

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[*] *Corresponding author. Tel.: +90 52 31 04.*
  E-mail address: ebl@toi.no

Methodological approach

We use registry data from the Oslo region covering all dwellings that were bought and sold in 2018. This data set is linked to background information on the households who made each transaction. We develop conditional logit models to answer the research question. The conditional logit model is written symbolically as follows:

$$p_{ij}(N_j, C_{(i)}) = \sum_{K=1}^{k} \frac{exp(\beta N_j)}{exp(\beta N_k)}$$

Where P_{ij} denotes the probability that a household i will buy a particular dwelling j from choice set ($C_{(i)}$), based on its (N_j) characteristics compared to those of all other dwellings (N_k) available in the same time period. For each household, we define a choice set by taking the dwelling that they bought, plus a random sample of 1,000 other dwellings that were on the market in 2018. Ideally, we would define the choice set by *all* dwellings on the market in 2018. However, in order to limit the amount of data, we follow the recommendations of Bruch and Mare (2012) and select a random sub sample of the actual available choice set.

The key independent variable is *PT accessibility*, defined as accessibility to employment opportunities via the PT service. We use a gravity model that weights the importance of employment opportunities by the travel time, following convention in research on accessibility and transport equity (Handy and Niemeier, 1997; Levinson and King, 2020).

Moreover, we control for attributes of the dwelling and the neighborhood it is located in (at the census tract level). Dwelling characteristics in the models are *house type* (apartment, row-house or single-family house) and *house size* (in square meters). As a supplementary test, we also add a control for *house price*, measured by price per square meter. On the neighborhood level, we include two control variables on urban form, *population density* and *building use diversity*. We also include a variable on *district* in the city (differentiated by inner city, inner suburbs and outer suburbs).

A limitation of the conditional logit model is that it is not possible to include control variables at the household level. This is because these characteristics of household i does not vary across ($C_{(i)}$). In order to explore variations across household groups, we therefore stratify the analyses by household groups, following the approach in previous studies using this technique (Galster et al., 2021; Hedman, 2013). In our study, we stratify the sample by two types of household characteristics, *income level* and *family type*. Income level distinguishes between low, medium and high-income households. This categorization is based on household income, weighted by household size. The low income includes households in the lowest three income deciles, high income is the highest three deciles, and medium is the middle four deciles. For family type, we use a grouping on selected stages in the life course, i.e. young households without children, households with young and older children, respectively, and older households without children.

(Expected) results

The preliminary results suggest that the likelihood of acquiring a dwelling with good PT accessibility increases with higher income. In other words, we confirm the insight from previous research that PT accessibility is a limited asset in urban contexts, and that high socioeconomic status is necessary to achieve adequate levels of PT accessibility through dwelling acquisition. At the same time, the relationship between PT accessibility and income varies with family type. It is especially in the *households with children under 6 years* group that we find a strong influence of income. Here, low-income families experience a strong, negative effect of PT accessibility on the likelihood of acquisition (-0.012, p<.001), while high-income families experience a strong, positive effect (0.011, p. <.001). At the same time, the influence of house price seems to explain much of this association. Housing with good PT accessibility is substantially more expensive than other housing and is thus more available among higher-income households.

These results suggest that low-income households are more dependent on the private car, and thus more vulnerable towards increased cost of car use, because they systematically purchase housing with lower PT accessibility than higher-income households. Moreover, this vulnerability is especially present among low-income households with small children, compared to other family types.

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