THE IMPACT OF ACCESSIBILITY ON RESIDENTIAL CHOICE

Empirical results of a discrete choice model

Berry Blijie MSc.
Faculty of Civil Engineering and Geosciences, Department of Transport and Planning,
Delft University of Technology, the Netherlands

ABSTRACT

The past decades the residential location choice of households has been subject of study in many researches. Nevertheless, the relation between accessibility and residential choice has shown to be hard to verify empirically. Such (empirical) knowledge, however, can help address many of the problems that urban regions are facing nowadays, like the (re-)location of residential areas and jobs, the planning of new infrastructure and predicting the amount of traffic generated by commuting and leisure activities.

The first part of the paper gives an introduction and an overview of the literature on residential choice behaviour, with an emphasis on research that studied the relation with accessibility. In the second half a theoretical model for residential choice will be presented, followed by the estimation results.

KEYWORDS

Residential choice, housing market, land use and transport interaction, accessibility, discrete choice

INTRODUCTION

The past decade major changes have occurred in the Dutch housing market, both in terms of the demand, quantitative as well as qualitative, and the supply side of the market. The new demand is mainly a result of demographic processes: phenomena like ageing of the population and the individualization of people increased the demand for more (smaller) dwellings. Furthermore, altered compositions of households and welfare situations lead to different preferences for housing type and attributes. The housing supply faces difficulties to match this (new) demand. This is mainly caused by the lack of available land in urbanized areas and the

small profits that can be achieved by building firms. This situation is also acknowledged by the Dutch government (Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer, 2004).

The changing housing market increases the need for a household to be flexible when searching for a dwelling in terms of the location and the dwelling type. The relatively well-developed transport system in the Netherlands is partly able to facilitate this flexibility. On the other hand, increasing congestion problems or the absence of good public transport may make a location less attractive to settle. The choice to which dwelling a household finally relocates is determined by the residential choice behaviour.

The residential choice behaviour is an import issue in the housing market. We define this behaviour as the choice for a dwelling on a location by a household. We assume that this behaviour is determined by three types of characteristics, namely aspects of the dwelling, the location of the dwelling and the household that is relocating. To understand the consequences of changes and (policy) interference in the housing market, we need to know more of this behaviour.
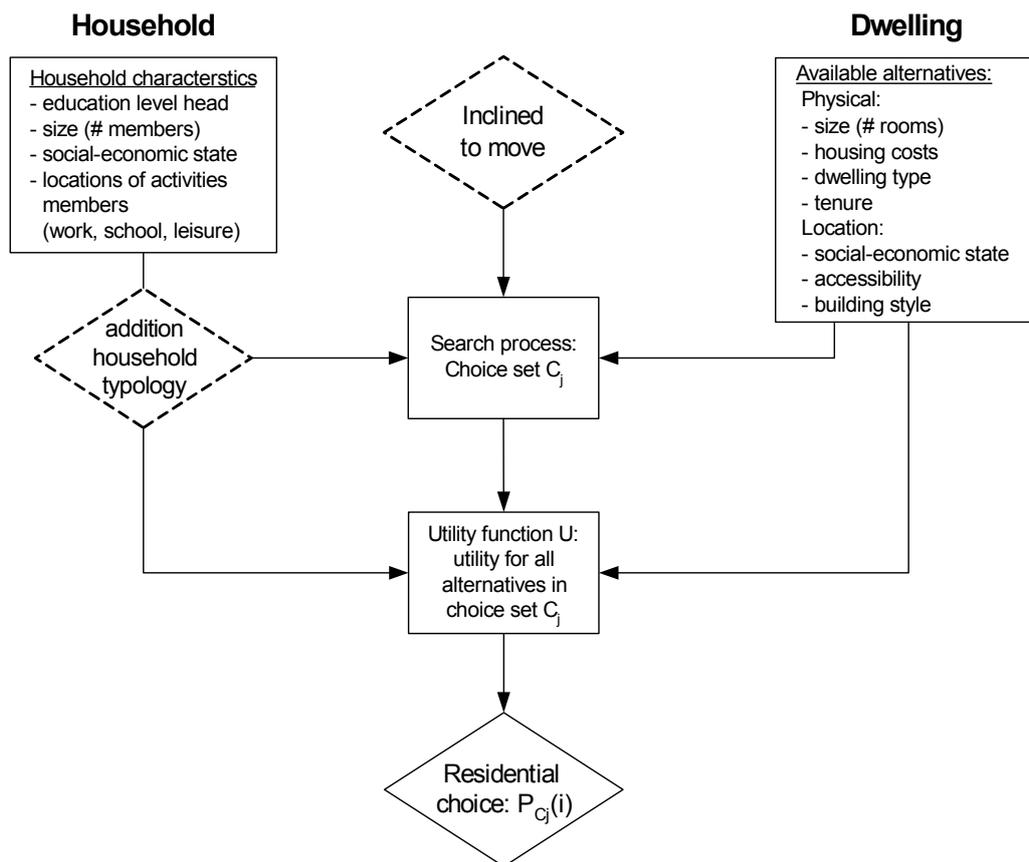
DATA & THEORETICAL MODEL

The model is estimated on revealed data derived from the National Housing Survey, in which over 75 thousand Dutch households were inquired on their current and previous housing situation. Different aspects of the residential choice decision are incorporated in the model, like the dwelling type, the location of the dwelling, the characteristics of the household, and the influence of accessibility.

We have designed a theoretical model to estimate the effect of accessibility on residential choice behaviour by households. The model is roughly based on the one presented by Brown and Moore in 1970. This choice behaviour is part of a bigger migration process, which consists of three steps: residential mobility, residential search and residential choice. Our focus, however, is on the last two steps. The theoretical model we eventually derived for this research is depicted in figure 1.

Choice set generation

The choice for a dwelling from a set of alternatives is a conditional decision that will be modelled in the form of an multinomial logit (MNL) model, based on random utility theory (McFadden, 1974). According to this theory we assume that a household attaches a utility to each alternative in a subset of alternative locations that are considered. Subsequently, the dwelling with the largest utility also receives the largest chance to be chosen.

Ideally, we want to estimate the choice behaviour on the actual, regarded choice set of alternative dwellings. However, this information is almost never available in revealed data sets. This is why we have chosen to generate a systematic choice set. This choice set is a random sample taken form the full set of available alternatives in the period of migration. We use a sample because the full set would be too large to estimate the model on, since we work on the lowest level of detail, namely (physical) dwellings on a location. A full set in this case would mean thousands of alternatives, which makes it impractical (and illogical) to apply.

Household

Household characterstics
- education level head
- size (# members)
- social-economic state
- locations of activities
  members
  (work, school, leisure)

Dwelling

Available alternatives:
 Physical:
 - size (# rooms)
 - housing costs
 - dwelling type
 - tenure
 Location:
 - social-economic state
 - accessibility
 - building style

Inclined
to move

addition
household
typology

Search process:
Choice set C_j

Utility function U:
utility for all
alternatives in
choice set C_j

Residential
choice: $P_{Cj}(i)$

Figure 1: Scheme of the theoretical model

RESULTS & CONCLUSIONS

Strong influence of individual accessibility

Regarding the influence of accessibility, the most important results are the sensitivity of households for the migration and commuting distances for head and its partner. In addition, the combination of car ownership and the proximity of on-ramps, railway station and public transport quality is significant with the expected sign for some of the households. Although car ownership is related with wealth, we believe that in this model it also stands for a lifestyle that is environmentally aware, because we also added other, social-economic variables in the model. The results show that people who do not own a car significantly relocate to neighbourhoods with better public transport facilities.

Minimal influence of general accessibility and neighbourhood

The overall influence of accessibility measures, apart from migration and commuting distance, is very small, whether or not interacted for household specific characteristics. This is probably caused by the relative high quality of the Dutch transport system and the spatial distribution of services, which has resulted over years in a homogenous (high) level of accessibility. This is probably the reason why empirical research on revealed residential

behaviour in the Netherlands (as described in this paper) is not able to find a significant and/or large influence of accessibility.

Moreover, we did not find a strong preference for the residential living environment; it seems that the dwelling type is of more importance. Of course, the relation between dwelling type and neighbourhood is strong: some types only occur in some neighbourhoods, but when a dwelling type is chosen, the environment of the dwelling seems not very important. Only social neighbourhood aspects like status and ethnicity issues have impact.

Choice for dwelling determines most movements

The preference for dwelling type is very strong, also in terms of the maximum perceived utility. In practice this implies that people are willing migrate or commute over longer distances, when they can have the dwelling type they long for. This has implications for the (Dutch) housing and transport policy. After all, unless travelling has become such a burden in terms of time (congestion) and costs (extra taxes and peak-hour charges), households will tend to relocate further away from their previous residential location and workplace when the preferred dwelling is not available in the direct vicinity. This could result in more car traffic. This process is enhanced by the pressurised housing market in Dutch urbanized areas like the Randstad, the western part of the Netherlands.

Future planners and/or policy makers will have to keep the strong influence of housing type in mind, because it could obstruct plans that want to stimulate smart growth and reduce car mileage. Future research plans to follow up this study include therefore the construction of a simulation model to examine the outcomes of various (policy) scenarios, like the effect of allowing rural living, discouraging car-usage and revitalizing the city centres.

REFERENCES

Brown, L.A. and E.G. Moore (1970) The intra-urban migration process: a perspective, in: *Geografiska Annaler series B 52*, pp. 1-13.

McFadden, D. (1974) Conditional logit analysis of qualitative choice behaviour, in: P.C. Zarembka (Ed.) *Frontiers in Econometrics*, Academic Press, New York and London, 1974, pp. 105-142.

Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer (2004) Nota Ruimte: ruimte voor ontwikkeling. Sdu Uitgevers, the Hague.