

A Dynamic Model of Urban Green Spaces, Residential Mobility and Real Estate Market

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ABSTRACT

RESIDENTIAL mobility and locational choice are one of the major drivers of urban land use change. Locational choice in turn is influenced by different factors, such as market value of housing, proximity to city center and working place as well as neighborhood characteristics (e.g. presence and quality of schools, hospitals etc.). We argue in this contribution that also environmental characteristics - which are represented by urban green spaces in the given study - are significant. In fact, the variety of urban green spaces, such as street trees, urban parks, forests and backyards provide urban ecosystem services: recreation, local climate regulation as well as air quality improvement [2] that might considerably influence the place that people prefer to live.

To better understand the locational choice, either hedonic pricing or agent-based modelling can be applied. We suggest systematically including both methods. The study is carried out for the city of Leipzig, Germany, a city of about half a million inhabitants with quarters of influx of population and other of significant abandonment. The empirical framework of the anticipated agent-based model will be based on the findings of hedonic pricing analysis that will demonstrate how real estate prices for residential housing are influenced by urban green spaces [7]. Hedonic pricing is based on the principle that the price of a marketed good is influenced by specific implicit characteristics of that good that can be disentangled and understood to either raise or lower the overall price [6]. The conventional influencing factors are house appearance and neighborhood characteristics, but also environmental characteristics. Therefore, as a first step, the aim was to estimate the extent to which price and demand can be af-

ected by various external factors or, in other words, what is people's willingness to pay for the particular good considering those factors.

The poster demonstrates the conceptual framework under development for simulating human decision-making in relation to locational choice and urban land use. This modelling is foreseen as a further step in the analysis of relationships of real estate market, residential mobility and the affiliated spatial pattern of urban ecosystem services demand and supply.

For the purposes of the given study, it is planned to simulate the feedbacks between urban green spaces, housing prices and residential decisions of the households. In other words, it is proposed to add the human decision-making to the locational choice and land use aspect with the help of the agent-based model. That will enable to get an insight how households consider market value as well as provision of urban ecosystem services (i.e. urban green spaces) in their locational choice.

NetLogo will be used as a modelling tool representing the interaction within the housing market between the owners of housing units and tenants. The latter have budget constraints and are heterogeneous in terms of their preferences but not in their decision-making algorithm. Additionally, the proposed agent-based model will be based on the Alonso's monocentric city model [1].

There are several studies on the agent-based modelling in the urban context [4], [5], [3]. In the frame of this study, it is planned to extend existing approaches, on the one hand, by placing emphasis on the proximity and different types of urban green spaces as one of the model inputs. On the other hand, in contrary to the most studies, renting prices will be used within a model. Thus, the formation of housing prices will follow a different approach than the previous models.

The anticipated agent-based model can be used for elaboration of scenarios for the joint development of urban green spaces and housing (e.g. in respect to the decisions on creation or removal of the green spaces) as well as demographic change. Additionally, it may be feasible to adapt this model for other cities.

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