No Hope for First-Time Buyers? Towards Agent-Based Market Analysis of Urban Housing Balance

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Abstract. The Dutch housing market comprises three sectors: social-rented, private-rented and owner-occupied. The contemporary market is marked by a shortage of supply and a large subsidised social sector. Waiting lists for social housing are growing, whereas households with income above the intended limit do not or can not leave the social sector. Government policy and market regulations change frequently, not least for political reasons. We examine the effects of government policy by means of an exploratory agent-based simulation. Results provide perspectives on how internal demand is impacted by regulations in a housing market suffering from a shortage, and weigh the pros and cons of policy measures.

1 Introduction and Background

The Dutch residential market is experiencing a housing shortage at the time of writing – an imbalance which is expected to grow in the medium term. The market comprises three sectors: social-rented (managed directly or indirectly by municipal governments), private-rented (regulated by a combination of municipal and national government), and owner-occupied (affected by the mortgage market).

Regulations for the social housing sector and for mortgages have resulted in a situation where first-time home buyers ('starters') with a middle-income in the market are both ineligible for social housing and unable to purchase a property [8]. Combined with the limited supply in private renting, this situation leaves a starter with very few options.

Starters who are eligible for social housing experience that the social-rented market has growing waiting lists in every major urban area [4]. We term 'external demand' those wishing to enter the housing market, notably starters. Occupying social housing are families with children living in one-bedroom houses, some waiting for their turn for a larger houses; others who got their turn but are now ineligible for larger social housing because they earn above the maximum income to qualify, but who are also unable to afford to rent privately or to purchase a property [6]. We term 'internal demand' those having a home currently but are dissatisfied with it. At the same time, however, there are 'empty nesters', parents whose children have moved out, who keep living in social houses that are big enough to support a family with children.

The shortage of supply causes imbalance: some households will not have a home to own or will pay more for the few available dwellings than they would otherwise; some households under-pay and others over-pay; some households lack space while others have space to spare.

The question we investigate is: how is internal demand impacted by regulations in a housing market suffering from a shortage? We address this question by developing an agent-based model (ABM) of the Dutch housing market, in particular the city of Amsterdam. This simulation model intends to achieve four purposes: 1. Contrast with economical models through the use of a different modelling technique. 2. Investigate the effects of regulations on specific household groups. 3. Provide a flexible approach in which policy changes and new policy can be easily studied.

2 Methodology and Related Work

We adopt agent-based modelling as it allows a focus on the choices of and effect on individual households within the regulations – renters, buyers and sellers – and the emergent city-level effects. The choice of ABM as a methodology is recommended by Boelhouwer and Hoekstra [2] who highlight the influence of regulations in both the rental and home-ownership sector on tenure choice. Additionally, the use of an ABM allows unexpected interactions between regulations to emerge. Boelhouwer [1] reviews the government policy in the Dutch housing market and concludes that the current policy creates social inequality. Further, he concludes: "Many citizens, and more specifically low-middle income groups and young households, do not understand the current policy choices which leads to an increasing distrust in government and to instability in society."

The majority of research on the housing market is either social–anthropological or economic in nature, and done at a *macro level*. The econometric models analyse the relationships between housing prices and market fundamentals. These models can analyse specific policies, as long as those policies can be described in terms of the economic variables; however, econometric models cannot accommodate individual-level behaviour and results. Because of this, these models are unable to predict emergent patterns caused by policy.

An important precedent for ABM is the work of Gilbert et al. [3]: an ABM of the English home-ownership sector. The authors show that a simplified model of the housing market can replicate key behaviours observed in the real market. Their model provides effective ways to model income and home-owner behaviour when income changes. However, from a spatial perspective, Gilbert et al. assume that buyers that cannot buy a home leave the local market to some alternative municipality. But if this alternative does not exist, such as in a scarce market, these buyers would not leave the market and keep providing pressure on the market. The second reason that the model of Gilbert et al. cannot be used for our research question is that it does not consider the rental sector.

A number of other works model aspects of the housing market or urban housing development using ABM. To our knowledge, none address the case of

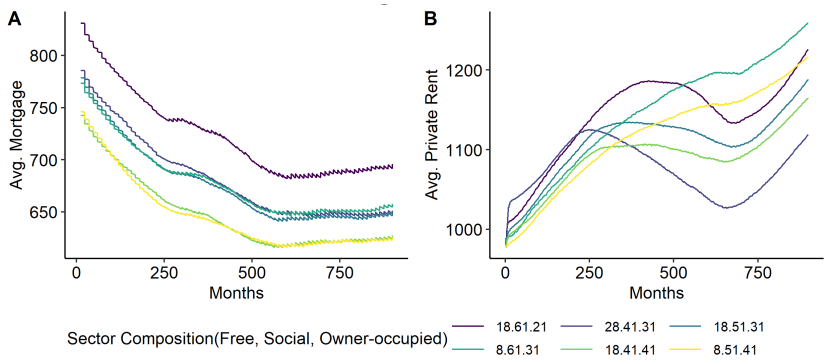

Fig. 1. Mean mortgage payment and monthly rent paid in the private sector.

a Dutch municipality setting with all three of social-rented, private-rented and owner-occupied dwellings. The closest are Ziengs and Yorke-Smith [10], who look at negotiation in Dutch property purchases using ABM, and Overwater and Yorke-Smith [7], who look at the peer-to-peer rental market in Amsterdam, again using ABM; Ligtenberg et al. [5] use ABM to study land planning but not residents' decisions.

3 Results and Outlook

In the context of the Dutch housing market, we argue that the interaction between choices of households and regulations in the social-rented, private-rented and owner-occupied sectors shapes the choices of households. The agents in the model are: households (as home-owners, sellers, renters), housing corporations (the non-profit organisations who manage social housing), and private landlords. The processes in the model are the households' search for a new place to live, the allocation of social housing, and the transactions in the private housing market. The processes are subject to current municipal and national regulations. ABM provides a convenient way to explore effects of what-if changes to regulations at both levels. A challenge is to traverse the temporal scales between the frequency of decisions of different types of agents – buying a property is not a weekly occurrence for most households! – the pace of regulatory changes, and the market effects to be observed beyond the short-term.

A full description of the model and results are found in Wiegel [9]. Figure 1, for example, examines ownership and rental costs in the private sector, between various sectoral compositions. The results find that in the social sector, selection may be preferable to lottery due to its bias towards households that already own a home. The metric of 'secondary waiting time' can be effective in helping split households find a home, but has unclear effects on other households. Third, increasing the income limit for the social sector is found to favour older households.

Last, market policies that encourage a change to behaviours – designed to increase housing stock utilization – can instead spur demand.

This work engages ABMUS participants by, first, providing a case study of urban agent-based micro-modelling and its interface with public policy. An open discussion is how (Dutch) policy makers can be informed by such modelling, during a period where the over-demand in the housing market is a current political topic. Second, discussing how construction of such ABMs strongly draws on public data portals e.g., data.amsterdam.nl, which are sometimes incompatible. Third, by furthering discussion of spatial and temporal ABM design for housing market micro-simulation [3]. Fourth, by continuing the discourse from previous ABMUS editions [10].

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