

on supply and demand curves or general equilibrium relationships which focus on aggregate totals rather than individual market participants. The recent shortage of rental housing units and price surges however, call for a more sophisticated understanding of urban rental market.

I spent most of my summer building a computational agent-based model in R, which allows me to incorporate heterogeneity in agent characteristics as well as observe interactions between landlords and tenants at a micro level. I started off with a simple musical chair algorithm where original tenants dynamically leave or relocate with a fixed probability while new tenants enter the neighborhood according to a Poisson distribution. Rental prices are initialized at 25% of tenant income on average and are assumed to correlate with

rent in the neighborhood and are constrained to apply only to those priced at no more than 50% of their income. With a constant probability, landlords select their incoming tenant using a fair lottery and they pick the applicant with the highest income otherwise.

In addition, I tried to capture rent setting behavior of landlords by considering two separate price formation processes. For renewed units, rent is assumed to vary at a rate linear in market trend, which I calculate as the average percentage change in prices for units that change hands within last three months. Once the occupancy rate hits 95%, rent will also increase proportionally to occupancy due to scarcity. The rent setting process for turnover units differs from that of renewed units by a vacancy term which reflects the common practice for landlords to lower the list price if their property is vacant last month. Since the turnover cost could be fairly high for landlords, they are tempted to keep tenants longer by maintaining a relatively stable rent for renewed contracts. As a result, the coefficients for the market trend term and the scarcity term are smaller in the renewed process than in the turnover process. In the more complex version of the model, I also allow tenants

and

posting on Zillow, as well as set up an approximate Bayesian computational model to infer model parameters

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