Directed search in the housing market

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ABSTRACT

In this paper, we present a directed search model of the housing market. The pricing mechanism we analyze reflects the way houses are bought and sold in the United States. Our model is consistent with the observation that houses are sometimes sold above, sometimes below, and sometimes at the asking price. We consider two versions of our model. In the first version, all sellers have the same reservation value. In the second version, there are two seller types, and type is private information. For both versions, we characterize the equilibrium of the game played by buyers and sellers. Our model offers a new way to look at the housing market from a search-theoretic perspective. In addition, we contribute to the directed search literature by considering a model in which the asking price (i) entails only limited commitment and (ii) has the potential to signal seller type.

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1. Introduction

In a pioneering paper, Dale Mortensen (1982) argued that search theory can – and should – be used to help understand the way that many different markets function. In that spirit, we present a directed search model of the housing market. We construct our model with the following stylized facts in mind. First, sellers post asking prices, and buyers observe these announcements. Second, there is not a straightforward relationship between the asking price and the final sales price. Sometimes buyers make counteroffers, and houses sell below the asking price. Sometimes houses sell at the asking price. Sometimes – more often when the market is hot – houses are sold by auction above the asking price. This is documented by Han and Strange (2014), who use a survey by the National Association of Realtors and find that between 2003 and 2006, when the housing market was booming, 13.5% of houses sold above the asking price, 29.4% sold at the asking price, and 57.1% sold below the asking price. During the "housing bust" period from 2007 to 2010, 8.2% sold above the asking price, 17.5% sold at the asking price, and 74.3% sold below the asking price.[1] Third, a seller who posts a low asking price is more likely to sell his or her house, albeit at a lower price, than one who posts a higher asking price.[2]

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[1] Case and Shiller (2003) conduct a survey in four cities, Boston, Los Angeles, Milwaukee, and San Francisco, and find that on average in 1988, 4.9% of houses sold above the asking price, 27.9% sold at the asking price, and 67.1% sold below the asking price. For 2003, the figures were 25.5% above the asking price, 48.4% at the asking price, and 29.1% below the asking price. Data from the Netherlands (see, e.g., De Wit and van der Klaauw, 2013 for a description of the data) are also consistent with our stylized facts.

[2] Merlo and Ortalo-Magné (2004), using UK data, find that a lower asking price increases the number of visitors and offers that a seller can expect to receive but decreases the expected sales price. Similarly, using Dutch data, De Wit and van der Klaauw (2013) show that list price *reductions* significantly increase the probability of selling a house.

Our model is one of directed search in the sense that sellers use the asking price to attract buyers. However, ours is not a standard directed search model in that we assume only limited commitment to the asking price.[3] The specific form of commitment to the asking price that we assume reflects the institutions of the U.S. housing market. Within a "selling period," buyers who view a house that is listed at a particular price can make offers on that house.[4] A seller is free to reject any offer below the asking price, but also has the option to accept such an offer. However, if one or more *bona fide* offers to buy the house at the asking price (without contingencies) are received, then the seller is committed to sell.[5] If only one such offer at the asking price is received, then the seller is committed to transfer the house to the buyer at that price. If the seller receives two or more legitimate offers at the asking price, then, of course, the house cannot be sold to more than one buyer. In this case, the buyers who bid the asking price can bid against each other to buy the house. In practice, in some locations, this auction takes the form of bids with escalator clauses. For example, if a house is listed at $1 million, a buyer might submit a bid of that amount together with an offer to beat any other offer the seller might receive by $5000 up to a maximum of $1.1 million.

Given limited commitment, what determines the asking prices that sellers post and what role do these asking prices play? Of course, the asking price for a spacious house that is located in a desirable neighborhood is typically higher than the asking price for a smaller house in a less desirable neighborhood. We assume that prospective buyers can observe these and more subtle "vertical" differences among houses, either directly or with the help of real estate agents. Instead, we focus on the role that asking prices play in directing search across houses that buyers view as *ex ante* identical. In particular, we are interested in the question of whether asking prices can direct buyers towards "motivated sellers," that is, those who are particularly eager to sell and are therefore more likely to accept a low counteroffer.

We begin, however, with a basic version of our model in which all sellers are equally motivated, i.e., have the same reservation value. This homogeneous-seller version of our model serves as a foundation for the heterogeneous-seller version but is also of interest in its own right. After observing all the asking prices in the market, each buyer visits a set of sellers. Upon visiting a seller, the buyer discovers how much he or she likes the house; that is, the buyer observes the realization of a match-specific random variable. This realization is the buyer's private information and we assume that observing it is costless.[6] Based on these realizations – and without knowing how many other buyers have visited these sellers – the buyer chooses a house to bid on and decides between accepting the seller's asking price and making a counteroffer (and, if so, at what level). The seller then assembles the offers, if any. If no buyer has offered to pay the asking price, the seller decides whether or not to accept the best counteroffer. If one, and only one, offer at the asking price has been received, then the house is sold at that price. If multiple offers at the asking price have been received, the buyers who made those offers are allowed to compete for the house via an ascending bid auction.[7] A payoff-equivalence result holds for this version of the model. All asking prices at or above the seller's reservation value give the seller the same expected payoff; asking prices below the reservation value yield a lower expected payoff. Similarly, buyers are indifferent with respect to any asking price greater than or equal to the common reservation value but strictly prefer any asking price below that level. Any distribution of asking prices greater than or equal to the common seller reservation value constitutes an equilibrium, and there are no equilibria in which any sellers post asking prices below the common reservation value. These equilibria are constrained efficient in the sense that, given the level of market tightness, the house always goes to the buyer who values it most if that value is above the seller's reservation value or, if not, it is retained by the seller. In addition, when market tightness is endogenous, equilibrium entails the optimal seller entry. These efficiency results follow from the payoff equivalence between the mechanism we consider and a second-price auction with a competitively determined reserve price.[8]

After analyzing the homogeneous-seller case, we consider a version of our model in which sellers have different reservation values and in which these reservation values are private information. Specifically, we examine a model in which there are two seller types – one group with a high reservation value ("relaxed sellers"), the other with a low reservation value ("motivated sellers"). In this heterogeneous-seller version of our model, the asking price can potentially signal a seller's type. In our signaling model, sellers have both *ex ante* and *ex post* signaling motives. *Ex ante* a seller wants to signal a low reservation value. This attracts buyers since buyers prefer to visit a seller who is perceived to be "weak." *Ex post*, however,

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[3] While we assume limited commitment to the asking price, we do assume full commitment to the selling mechanism, which will be discussed below.

[4] We assume that each buyer can bid on at most one house within a selling period, but a seller may receive multiple bids. Our urn-ball meeting technology is "many-on-one" or what Eeckhout and Kircher (2010) call "nonrival." The urn-ball meeting technology is also what Lester et al. (2015) call "invariant."

[5] This commitment is often written into contracts between sellers and their real estate agents in the form of a clause requiring the seller to reimburse the agent's fee if a *bona fide* offer is rejected.

[6] Lester et al. (2013) consider a directed search model in which there is a cost to observe the match-specific value. In their model, buyers sequentially pay this cost and observe their valuations. The selling process terminates when a buyer accepts the asking price, or, if no buyer accepts the asking price, the seller sells to the buyer with the highest bid if that bid exceeds the seller's reservation value. Our assumption that it is costless to observe the match-specific value reflects our view that in the housing market, once a buyer visits a house the cost of observing the valuation is minor, although the cost of inspection (usually done after a contract is reached) can be high.

[7] In a tight market, we sometimes observe buyers submitting initial bids above the asking price. We assume that sellers are committed to allowing all buyers who bid at least the asking price to participate in the auction, so it is not in any buyer's interest to make an initial bid above the asking price. Buyers do, however, make bids above the asking price in the subsequent auction.

[8] In Albrecht et al. (2014), we prove efficient seller entry in a competing auction model in which sellers post second-price auctions. Here we extend the result to a market in which asking prices may exceed the seller's reservation value and counteroffers below the asking price are possible.