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A search-theoretic model of the rental and homeownership markets

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ABSTRACT

This paper presents a simple model of the rental and homeownership markets in a unified framework. The paper then investigates the model's positive and normative properties, applying ideas developed in search and matching theory. I analytically address the comparative static and welfare implications of the model. In addition, as an extension toward realism, I consider a version of the model with free entry of housing supply, while the benchmark model assumes exogenous housing supply. To examine the benchmark model's dynamics, I generate the impulse responses of house prices, rents, and housing occupancy patterns to an increase in housing supply and show that house prices react more than rents in the short run.

1. Introduction

A simultaneous treatment of the rental and ownership markets of housing can provide both normative and positive insights for the housing market. In addition, it is reasonable to view the housing market as a market with search and matching friction, considering the substantial duration of time needed to purchase and sell a house. However, while there is a rich literature on the labor market,[1] little (although growing) work applies search and matching theory to the housing market.

This paper constructs a simple model to study the comparative statics and welfare of the housing market analytically, and to investigate the dynamics of house prices, rents, and housing occupancy patterns, applying ideas developed in search and matching theory. Unlike the majority of the literature that applies search and matching theory to the housing market, this paper's model studies the rental and ownership markets in a unified framework.

I present an overview of the simple model, as follows. I assume that there are two locations. While this assumption may be somewhat restrictive, it is straightforward to extend the model to multiple locations. The total population is fixed and constant. In each location, there is a fixed measure of housing units. People occupy these housing units either by renting or owning. It is assumed that people enjoy higher utility from owned units than from rental units. Households have to move out to the other location with certain probabilities, with different probabilities for renters and homeowners. Renters who do not move out seek to purchase housing units, but they have to search for them. Their search succeeds with a probability that depends on the number of other agents looking for houses and the number of available units. On the supply side, it is assumed that in each location there is a real estate sector that can either rent out or post the housing units for sale.

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[1] For a comprehensive review, see Pissarides, 2000.

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In the latter option, the real estate sector searches for new homeowners and successfully finds them with a probability that depends on the number of renters and housing units on the ownership market.

The model is simple and tractable, but rich enough to address the comparative statics and welfare of the housing market, and the dynamics of prices, rents and housing occupancy patterns. Assuming symmetry of the two locations, I first show that a unique steady state equilibrium exists. Then, focusing on the symmetric steady state equilibrium, I prove analytical properties of the model. For example, I show that in the model, welfare and the measure of homeowners increase when there is an increase in housing supply. Moreover, I show that house prices and rents decline in response to the increase in housing supply.

A simple model is a good starting point. Later, when it is fully understood, it is enriched in the direction of realism. This paper first presents a simple model, then thoroughly analyzes it normatively and positively. As an example of possible extensions toward realism, I allow free entry of housing units. This extension maintains the tractability of the model and can provide analytical results. I take the cost of construction as a parameter and discuss the comparative statics with respect to an increase in this cost. Given an increase in construction cost, the following properties are proven. First, the measure of homeowners and the housing supply decline. Second, when the measure of homeowners is sufficiently large, welfare unambiguously decreases. Third, house prices and rents increase.

The first and third properties are intuitive, indicating that the model provides reasonable qualitative insights despite its simplicity. As for the second property, note that the measure of homeowners is high when the matching technology is efficient enough. In such a case, since houses are easy to sell, even though the construction cost per unit increases, the supply does not decrease very much. Since social cost is determined by per-unit cost multiplied by the number of housing units constructed, the effect on the first factor dominates the other and social cost increases, leading to lower welfare.

In addition to the comparative statics mentioned above, I theoretically consider responses to a change in utility from owning a house and the probability of moving. These issues are addressed both in the benchmark model with fixed housing supply and in the version of the model with free entry of housing units.

This paper thoroughly examines the benchmark simple model. The stage is then set to extend the model. In addition to free entry, a number of extensions are needed to offer a fully developed normative analysis; such extensions are left for future research. For example, one could imbed relocation decisions by assuming that households choose the location that gives the highest value to them. In this extension, one might need to model heterogeneity in income or job opportunities across locations. In addition, one could consider heterogeneity in owner-occupied housing and households' tastes, and make the decision between renting and owning endogenous. Further, the supply margin, which I consider by allowing free entry with linear costs, could be extended. In reality, housing supply may not be as elastic as free entry with linear costs. For example, one could consider construction as a function of variable capital and fixed land.

Using the benchmark model, I conduct a numerical experiment to investigate the dynamics of house prices, rents, and housing occupancy patterns with regard to an increase in housing supply. In response to the increase in housing supply, the measure of homeowners gradually increases until it reaches a new steady state level. House prices and rents substantially decrease immediately after the change in housing supply, but the degree of the instantaneous decline in house prices is larger than that in rents. In fact, this ordering in the degree of short-run changes is consistent with empirical observations that house prices fluctuate more than rents. In general, it is not easy to generate volatile asset prices in the presence of relatively stable dividends.[2] However, the simple model presented in this paper implies dynamics consistent with empirics.

To my knowledge, a novel feature of the model developed in this paper is that it is a simple and tractable model that incorporates the rental and homeownership markets simultaneously but nevertheless able to address analytically welfare and comparative statics of the housing market and to numerically generate dynamic responses of the endogenous variables, including prices, rents, and housing occupancy patterns. This paper builds on a pioneering paper by Wheaton, 1990 that applies ideas from the Diamond–Mortensen–Pissarides (DMP) search and matching model[3] to the housing market. While Wheaton, 1990 focuses on the homeownership market, this paper studies the rental and ownership markets in a unified framework. Among studies that apply the DMP search and matching model, Anglin and Arnott, 1999 study real estate brokers' commission rates in the ownership market, and Igarashi, 1991 focuses on the rental market. In addition, the aforementioned three papers focus on a steady state equilibrium and investigate comparative static properties. Among others, Williams, 1995 embeds a stochastically evolving state variable (housing services) and derives the pricing process of real assets with costly search and bilateral bargaining. Similarly, Krainer, 2001 assumes uncertainty in housing services and shows how house prices, liquidity, and sales volume depend on the value of housing services.

Recently, there has been increasing interest in studying the housing market in the search and matching framework. Taking an approach similar to that of Wheaton, 1990; Piazzesi and Schneider, 2009 present a model in which a small number of optimistic households can affect house prices, and Burnside et al., 2011 construct a model with heterogeneous expectation to study house price booms and busts. Díaz and Jerez, 2013 quantitatively examine the business cycle properties of the search and matching model of the housing market. Kim, 2012 constructs a search model in which the liquidity of an asset and selection of sellers and buyers are endogenously determined. Ngai and Tenreyro, 2013 apply a stochastic job-matching model by Jovanovic, 1979 to the housing market to explain

[2] Kocherlakota, 1996 provides a detailed survey of asset pricing puzzles.
[3] See, e.g., Diamond, 1982 and Mortensen and Pissarides, 1994.