



# Alas, my home is *my* castle: On the cost of house ownership as a screening device



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## ABSTRACT

This paper analyzes a model in which housing tenure choice serves as a means of screening households with different utilization rates. If the proportion of low-utilization types is small, there is a separating equilibrium at which tenure choice acts as a screening device: consistent with empirical evidence, low-utilization households buy a house, while high-utilization types rent. Otherwise, there is a pooling equilibrium. The reason why, contrary to standard screening models, a pooling equilibrium possibly exists is indivisibility of home ownership, which makes it a very costly screening device. Introducing partial ownership restores the standard results: non-existence of a pooling equilibrium and possible non-existence of equilibrium.

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## 1. Introduction

*“Why ‘the second half of your home may be the worst purchase you will ever make’”.*

*Subtitle of Caplin et al. (1997).*

This paper presents a model of a housing market with asymmetric information, in which housing tenure choice is used as a screening device.

Consider a housing market where maintenance cost and/or house value are risky and not verifiable, so the landlord carries the risk for a renter-occupied house (see Henderson and Ioannides, 1983, henceforth “HI”, p. 100). The market is populated by risk-neutral investors and two types of risk-averse households, which differ in terms of their utilization rates, which are not observable. Initially, the houses are owned by the investors. Households either rent or buy a house from them. Given their risk-neutrality, investors are willing, in principle, to provide insurance against maintenance cost and house value risk by renting the houses to the households at a fixed rental rate. For the sake of clarity, ignore all other possible rationales for renting versus buying besides risk shifting, such as taxes, transaction costs, differential access to credit markets, and economies of scale in the owning and management of real estate (Benjamin et al., 1998). If all households rent, the

low-risk households pay more than the fair rent, given their true utilization rate, so they have an incentive to reveal their type. Since there are no verifiable differences between different renters or between different homes, the only possible way to accomplish this is to buy (one-hundred per cent of) a house, at terms which are unattractive to high-utilization households, thereby eschewing the insurance provided by a rental contract.

The equilibrium analysis follows Rothschild and Stiglitz’s (1976, henceforth “RS”) pioneering analysis of the insurance market. There exists a separating equilibrium, at which low-risk households buy and high-risk households rent at the fair rate calculated on the basis of their true utilization rate, if the proportion of low-utilization households is small. Giving up the insurance provided by a rental contract is less harmful to households with a low utilization rate in this case than accepting a rental contract which is designed for a household with average utilization rate. While there are numerous applications of RS to real estate (briefly reviewed below), to the best of our knowledge, ours is the first such model in which housing tenure choice serves as the screening device.<sup>1</sup> As

<sup>1</sup> Miceli (1989) applies RS to the rental market (see the literature review below) and then adds heterogeneous purchase transaction costs. The equilibrium of the rental market is a separating equilibrium. So low-utilization low-transaction cost households have an incentive to buy in order to avoid cross-subsidizing high-utilization households. Tenure choice is not the screening device employed in an RS-type equilibrium, but a means to overcome the screening costs in the rental market separating equilibrium.

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low-utilization households live in their own house, while high-utilization individuals rent, the separating equilibrium is consistent with Galster's (1983) observation that the probability of problems like cracks, holes, and broken windows or steps is 10–15% lower for owner-occupied than for renter-occupied single family homes and with Shilling et al.'s (1991) finding that tenant-occupied single-family housing depreciates 0.5–2.5% faster than owner-occupied property.<sup>2</sup>

If, on the other hand, the proportion of low-utilization households is large, the equilibrium is a pooling equilibrium, at which all households rent at the rental rate calculated on the basis of the average utilization rate. Standard screening models, which apply the RS insurance market model to other kinds of markets, emphasize the general non-existence of a pooling (Nash) equilibrium.<sup>3</sup> The root cause of the possible existence of a pooling equilibrium in our model is the indivisibility of house ownership: while insurance coverage and the amount of collateral for a loan are variable, “the current housing market has a major indivisibility because one can not own only part of a house” (Caplin et al., 1997, p. 85). This “major indivisibility” plays a decisive role in the theory of portfolio choice with housing (see Grossman and Laroque, 1990, and the subsequent literature). The argument is related, in a way explained below, to equilibrium in the insurance market with a single insurance contract (see Bolton and Dewatripont, 2005, p. 603).

To shed further light on the impact of indivisibility of home ownership, we introduce partial ownership to the model. There is positive demand for partial ownership, because it is a cheaper way to reveal their type for low-utilization holds than a complete purchase. Allowing for arbitrary proportions of ownership takes us all the way back to the standard RS results: a pooling equilibrium does not exist; a separating equilibrium, at which high-utilization households rent and low-utilization households own part of the house they live in, exists if high-utilization types are sufficiently frequent. Some partial ownership programs exist in practice, mostly publicly-supported programs in Anglo-Saxon countries aimed at increasing affordability (see Davis, 2006, for the U.S. and Whitehead and Yates, 2010, for the U.K. and Australia). Caplin et al. (1997) make a proposal how to advance partial ownership (“housing partnerships”) in order to avoid the strong concentration on housing in households' asset portfolio. Caplin et al.'s (2008) shared appreciation mortgages (SAM) proposal is a step in the same direction, proposing partial ownership as a means of reducing financial distress in times of crises. Yet, given that partial ownership is the exception from the general indivisibility rule, this does not seriously invalidate the conclusion drawn from our baseline model that equilibrium pooling cannot be ruled out.

While the analysis is cast in the context of residential housing, it can be reinterpreted as a model of commercial real estate.

Our model makes a contribution to the literature on housing tenure choice in the presence of asymmetric information (see Hubert, 2006). This literature is inspired by HI, who emphasize the “fundamental rental externality” (p. 99; or “asset abuse problem”, Benjamin et al., 1998, p. 224) that occurs if the degree of utilization

is chosen by tenants and is not verifiable.<sup>4</sup> We follow Miceli's (1989, p. 404) reinterpretation of the HI rental externality as an adverse selection problem, stemming from the fact that different tenants are characterized by different (given) rates of utilization. In Miceli (1989), housing services represent a second verifiable variable, so that different rental contracts specifying the levels of rent and housing services can be used to screen tenants, as in RS. Several related papers propose other terms of rental contracts as means of screening tenants with different degrees of utilization, for instance terminability (Hubert, 1995) and net versus gross leasing (Mooradian and Yang, 2002). A related strand of the housing literature investigates screening in mortgage markets using non-interest contractual terms, such as mortgage points (Chari and Jagannathan, 1989; Stanton and Wallace, 1998), LTV (Brueckner, 2000), and FRM versus ARM (Posey and Yavas, 2001). What distinguishes our model from this industry of screening models is that it employs the seminal RS approach not in the context of screening renters by means of a menu of rental contracts or screening buyers by means of a menu of mortgage contracts, but in a setup where housing tenure choice serves as the screening device. Needless to say that this focus on the rent-own decision is not meant to de-emphasize the relevance of screening different types of buyers and of screening different types of renters but to add a novel, and we think important, aspect to the literature on screening in real estate markets.

The paper is organized as follows. Section 2 introduces the model. The equilibrium analysis is in Section 3. Section 4 introduces partial ownership. Section 5 concludes.

## 2. Model

Consider a static model of a residential housing market. There are a large number of households looking for a home and at least as many investors, each of whom initially owns a house. Each household has to either rent or buy a house from an investor. The only contractual term of a rental contract is the rent paid  $R$ , payable at the beginning of the period; the only contractual term of a purchase contract is the price  $P$ , payable upfront. We argue below that there is no scope for using other contractual terms.

The investors are risk-neutral. As usual in the screening literature, they obtain a given level of expected payments, irrespective of whether they offer their house for rent or for sale. The value of these expected payments as of the end of the period is denoted  $\bar{\pi}$  ( $>0$ ). One possible interpretation is that there are more investors than households, the investors have no bargaining power, and  $\bar{\pi}$  is the expected value of an outside option, such as the use of the property for a different purpose than residential housing, possibly after a period of vacancy and/or incurring adjustment costs. Another interpretation is that there are as many investors as households, there is no outside option for investors, so each investor either rents or sells his house, and  $\bar{\pi}$  is a measure of their bargaining power in negotiations with households.

The households are subdivided into two classes  $j = L, H$ . The end-of-period value of a house occupied by a type- $j$  household is  $V$  ( $>0$ ) with probability  $1 - p_j$  and  $V - I$  with probability  $p_j$  (where  $0 < I < V$  and  $0 < p_L < p_H < 1$ ).  $I$  can be thought of as reduction in house value due to wear and tear or as costs of maintenance and repairs.  $p_j$  is a measure of type  $j$ 's utilization rate. Type- $H$  households have a higher utilization rate than  $L$ -types. The probabilities  $p_L$  and  $p_H$  are exogenous, so there is not an asset abuse problem. However, household type is private information and, therefore, not verifiable. As argued by HI (p. 100), the incidence of a value loss  $I$  is not verifiable either: “the marginal costs of increased breakdowns and wear and tear caused by increased rates of utilization cannot be fully charged to the tenant. It is impossible to explicitly provide in rental contracts for all possible contingencies, let alone

<sup>2</sup> Gatzlaff et al. (1998) report a difference in appreciation between owner-occupied and renter-occupied houses of only 0.16% per annum. Malpezzi et al. (1987) find that the depreciation rate for owner-occupied property falls below that for renter-occupied property only after several years of use.

<sup>3</sup> Bester (1985) shows that collateral requirements can be used as a screening device in the loan market, thereby helping to avoid credit rationing (cf. Stiglitz and Weiss, 1981; Arnold and Riley, 2009). Riley (2001, pp. 438 ff.) shows how RS-style screening works in the labor market. Applications to real estate are briefly reviewed below.

<sup>4</sup> Interestingly, the possibility of a signalling equilibrium is already mentioned by HI (footnote 2, p. 102), who “do not see the basis” for the assumption that “lower utilization rates are negatively correlated with signalling costs”, however. In our setup, this correlation between utilization rate and screening cost follows naturally from risk aversion: low-risk households are more willing to give up the insurance provided by a rental contract.

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