The Economic Theory of Housing Tenure Choice

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This essay gives a non-technical review of issues in housing market theory from the perspective of the choice between ownership and renting. It has been written for a Companion to Urban Economics.

Introduction

Within the theory of housing markets, one may broadly distinguish three approaches — which roughly correspond to the historical development of the discipline. The first retains the assumption of a perfect, frictionless, competitive market mechanism when addressing issues of localization, heterogeneity, durability, housing taxation etc. This line of research reached a considerable degree of maturity in the mid–eighties. It has greatly improved our understanding of urban spatial structure, the determinants of housing supply and demand, and the measurement of prices for heterogeneous goods. Given the assumption of a perfect mechanism for the allocation of housing, however, the welfare implications remain humdrum. With the possible exception of neighborhood externalities, housing markets appear efficient, provided that all agents are forward–looking and rational.

The second approach emphasizes imperfect competition and frictions resulting from search cost, mobility cost and contractual incompleteness. A central question is how markets actually achieve coordination in the absence of a Walrasian auctioneer, given all the particularities of housing. Stimulated by the advances in the theory of imperfect information, incomplete contracts, optimal search and matching markets, this strand of research 'took off' in the eighties and has made substantial achievements since then. The literature deals with a broad range of issues e.g. the role of real estate agents, the purpose of the various features of rental contracts, vacancy

rates, optimal pricing strategies and search behavior etc. This approach delivers a more realistic picture of the institutions and mechanisms through which coordination is achieved and adds a cautious note with respect to the welfare properties of the housing market. Due to search and mobility cost, competition is imperfect even with a large number of agents on both sides of the market. Search externalities give rise to vacancy rates which deviate from first–best, and incomplete contracts create subtle turnover externalities. Not surprisingly, the policy implications tend to be more exciting. In principle, efficiency can often be enhanced through appropriate state intervention, though practically, the very same features which prevent the market from achieving first–best efficiency make the desirability of government intervention moot.

Building on these achievements, a third strain of literature analyzes the implications of these imperfections for the dynamics of housing markets and their interaction with other sectors, such as financial markets and labor markets. What explains the fluctuations in housing prices? Why does the volume of sales appear to increase and the average waiting time from listing to sale appear to decrease in rising markets as compared to falling markets? Can a downturn in real estate cause a credit crunch through its impact on collateral values? May this in turn aggravate the crisis in the housing market? Recent analysis suggests that imperfections in housing and credit markets may interact and generate fluctuations which are difficult to explain by looking at each market in isolation.

I will not try to provide a comprehensive review of housing market theory here. In particular, this essay does not cover important topics like models of housing demand, filtering models, etc., which are well covered in the reviews of Arnott (1987) and Smith & Rosen & Fallis (1988). Instead, tenure choice has been chosen as the leitmotif. While many of the alleged particularities of housing markets are, in fact, shared to a considerable extend by other markets, housing appears to be the only commodity for which renting and ownership coexist roughly on equal scale. Since many of the advantages of ownership are the shortcomings of renting and the best reasons for renting are the drawbacks of owning, a thorough understanding of tenure choice will give us a lot of mileage in the analysis of the housing market.

Sometimes the choice of tenure is analyzed narrowly, with an undue focus on the demand side. However, there would be no choice for consumers if all owners would

prefer to sell rather than to rent out (or the other way round). Hence, we consider tenure choice as a joint decision on both sides of the market, consumers and suppliers, over the contractual forms of housing exchange. Finally, ownership and renting are fairly complex institutional arrangements the exact meaning of which differs from country to country due to different regulations and business practices. In this essay, the focus is on principles rather than on the diversity of institutional details.

We start by briefly looking at a perfect, frictionless market for durable housing in which only taxation may affect tenure choice. Then we analyze renting and owning as alternative arrangements for the solution of interrelated problems of asymmetric information, incentives and contractual incompleteness at the consumption stage. In doing so, we assume that the household has already found the desired house. Next, we ask how landlords and tenants, or sellers and buyers interact at the allocation stage. What are the implications of heterogeneity and imperfect information for housing search, housing prices and vacancy rates? Finally, we combine results from the two stages, search and contracting, in order to derive some implications for the dynamics of the housing market.

Durable Investment and Taxation

There is little doubt that the tax system plays an important role for housing investment and tenure choice. As housing investment is of long duration and transaction costs are high, a proper analysis of the impact of taxation requires a look at the whole expected lifetime of the building including major renovations and perhaps changes of ownership. Important qualitative insights, however, can be gained by analyzing a simple one period model, abstracting from transaction cost. Let V denote the initial value of the housing unit, δ the (ap)depreciation factor, reflecting the change in market value over the period, r the interest rate on bonds and R the rental value (cash flow). In a world without taxes, an investor will be indifferent between investing in housing and investing in bonds if his terminal wealth is the same, hence if $(1+r)V = R + (1+\delta)V$. Note that this condition would also make the user indifferent between owning, in which case his end of period wealth would be $(1+\delta)V$, and renting, which yields $(1+r)V - R$. An alternative representation of the condition states that capital cost has to equal the return on real investment

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$r = R/V + \delta.$

When income is taxed at a rate τ, absence of arbitrage requires that after tax income from financial investment equals after tax–income from real investment: $r(1 - \tau) = R/V + \delta - \Delta$, where the 'wedge' Δ summarizes the impact of all the tax–rules which apply to the real investment. The theory of income taxation provides two benchmarks to evaluate a tax system. Inter–sectoral neutrality requires that the tax–wedge Δ is the same for every form of real investment, e.g. rented and owner-occupied housing. This would ensure that marginal gross-return on investment the same for different forms of investment; hence, tenure choice would not be distorted by the tax system. Inter–temporal neutrality requires the wedge to be zero. Only in this case can all projects be financed for which gross–returns are large enough to compensate the investor for the loss of current consumption.

In reality, taxation of owner occupied and rented housing is very complex and differs a lot across countries and time. However, as a general rule, income from rented housing is taxed, mortgage interest can be deducted and the property value is depreciated for tax purposes according to some accrual method. On the tenant's side, rental payments, as any other consumption expenditure, is irrelevant for taxation. In some countries, owner occupied housing is treated similar to other ordinary consumption goods, like cars etc., with no tax on imputed rent, no deduction of interest and no depreciation allowances. Other countries allow (limited) interest deduction or depreciation or offer direct subsidies to owner occupation. On the other hand, there are often additional taxes on housing, land taxes, property taxes, and transaction taxes, which are ignored here. Let V_E and V_D denote the amount of equity and debt, respectively, invested in the project, and a the depreciation allowance. The absence of arbitrage requires the after–tax wealth to be equal for financial investment (left hand side) and rented property (right hand side):

$$(1 + (1 - \tau)r)V_E = (1 - \tau)R + \tau a V - (1 + (1 - \tau)r)V_D + (1 + \delta)V.$$

If owner occupation is taxed like a consumption good, we have the corresponding condition for ownership:

$$(1 + (1 - \tau)r)V_E = R - (1 + r)V_D + (1 + \delta)V.$$

Solving these equations for the wedges Δ_r (rented property) and Δ_o (owner occu-

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pation) we obtain:

$$\Delta_r = \tau r - \frac{\tau}{1-\tau}(a+\delta) \qquad \text{and} \qquad \Delta_o = \tau r(1 - V_E/V).$$

As a rule, these wedges will not be the same. As for rented property, true economic depreciation would require $a = -\delta$, yielding a tax–wedge of $\Delta_r = \tau r$ which would confirm to the ideal of a comprehensive capital income taxation. However, in many countries depreciation rules are fairly generous, allowing positive depreciation for tax purposes even if property values appreciate. Hence, after–tax capital cost for investment in rented property may be much lower than for other fixed assets such as machinery. The tax burden of owner occupation, Δ_o, depends on the financial structure V_E/V. The more equity the occupier can provide, the lower is the tax burden on ownership. In the limit, as full equity financing is approached ($V_E = V$), the tax–wedge is reduced to zero. This helps to explain, (i) why more wealthy people tend to own and (ii) why owners tend to accumulate additional wealth by redeeming their mortgages.

The spirit of this analysis changes little when complexity is added by extending the model to many periods and by incorporating more complicated tax schemes. One can ask how different marginal tax–rates, inflation, or more durable housing types, as described by a larger δ, influence tenure choice by analyzing their impact on Δ_r compared to Δ_o. For example, Titman (1982) investigates the US tax–system which, at that time, allowed owners to deduct nominal interest. He concludes that an anticipated increase of inflation benefits (i) high–income home-owners at the cost of low–income homeowners and (ii) renting at the cost of ownership. However, as a rule, it is difficult to come up with a clear welfare assessment of housing taxation, because optimal inter–temporal allocation is achieved only if the tax–wedge of all forms of real investment is zero. Hence, a more favorable tax treatment of housing, or a particular form of tenure, while distorting the structure of real investment, may nevertheless help to increase overall investment and economic growth.

Without denying the importance of taxation for the tenure choice, it is clear that other considerations are important as well. For example, there are clear patterns that flats in multi–story buildings tend to be rented, whereas single–family houses tend to be owned, and that young household tend to rent and switch to ownership only later. These regularities can be observed for countries with large differences in

income levels, tax–codes, and even economic systems, suggesting that tenure choice involves other fundamental trade–offs.

Incomplete Contracts and Incentives

We will develop the basic problem of contracting over housing from few simple observations on mobility cost and investment. Most households want to stay in their home for a considerable period of time. The right to stay is valued for a number of reasons. A move to a new premise requires time and effort for search, is inconvenient and is expensive. Moreover, many people tend to develop a psychological attachment to their home and neighborhood, which makes them less willing to move over time. These costs have to be traded off against the possible gains from moving. Apart from the need to relocate, a change of quantity or quality of housing often requires a move due to ex–post indivisibilities. Hence, a better job offer, changes in income and family composition etc. often make a move highly desirable. Such events turn moving costs into moving gains. For simplicity, however, we only speak of mobility cost, understanding that moving gains are equivalent to negative mobility cost.

To some extent, mobility cost can be considered as exogenous from the viewpoint of housing market analysis. But there are also elements which are endogenous. Much of the investment in decoration, furniture etc. is idiosyncratic and lost if the household moves. The more time, effort and money the household spends to adjust his home to his particular needs, the less will he be inclined to accept an alternative housing offer — even if this has the same market value as his present accommodation. Both the occupant's investment and many of the exogenous factors determining mobility cost are difficult to observe by third parties and not verifiable in court. Therefore, contracts explicitly depending on mobility cost are generally not feasible. Hence, mobility cost, measured by the difference between the utility in the present home and in the best alternative on the market (i) is on average positive, (ii) has a stochastic component, (iii) depends on the occupant's investment, and (iv) is non–contractible.

The market value of an accommodation depends on continuous maintenance, care and diligence of utilization etc. In apartment blocks, these requirements extend to the common structure. Housing tastes are rather individualistic; therefore, the kind of investment a particular occupant favors most often differs from what would

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maximize the market value of the premise. Again, many aspects of the occupant's conduct are not contractible — being unobservable by a third party acting as an arbitrator or too vague to be explicitly stipulated. It is also not possible to determine investment in any detail for a longer period in advance.

These observations suggest that, ideally, the occupant should (i) enjoy tenure security, (ii) have the right to decide upon investment, and (iii) be the residual claimant for changes in market value. If the house is a detached bungalow and the household is sufficiently wealthy and risk neutral, this ideal can be achieved through ownership. In all other cases, a compromise has to be found. We will consider rental contracts first and then turn to ownership.

Rental Contracts

Under a rental arrangement, the landlord is the residual claimant to the property value and retains the right to decide upon major investments, while minor investments are often delegated to the tenant. Perhaps the most important and controversial issue is tenure security. For simplicity, we consider only two types of contracts. These are a short–term contract, which can be terminated at short notice and will be renegotiated many times during the course of a typical tenure, and a long–term contract which grants the tenant tenure security and predetermined rent. Long–term contracts may have a fixed term or may be for an indefinite duration. In the latter case, they will usually involve clauses for rent reviews and allow the landlord to give notice under special narrowly defined circumstances (demolition of the building, own use etc.).

Short–term contracts have two advantages. They are easy to write and they create strong incentives on the part of the tenant to keep cost of maintenance and administration low by minimizing wear and tear, avoiding trouble with neighbors, etc. A landlord who is displeased with his tenant's conduct will give notice to quit or raise the rent to cover these costs.

However, they suffer from an important drawback. Given that most tenants would suffer from a moving cost in case of contract termination, the landlord has an increased bargaining power ex–post even if the market is competitive ex–ante when the contracts are negotiated. Tenants will anticipate that their immobility may

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be exploited at contract renewal and underinvest in idiosyncratic assets and renovation. This version of the well known 'hold up' problem has been analyzed by Kanemoto (1990). Tenants who have a strong preference for individual investments will, therefore, try to negotiate long–term contracts providing them with tenure security. These contracts protect the tenant against eviction, provided the landlord has no 'just cause' for doing so (e.g., clear cut breach of contract, rent arrears) and predetermine future rents. Obviously, these contracts will be more complex, hence costly to write and enforce, and compromise on the incentives of the tenant.

A number of countries regulate residential leases to ensure that all tenants enjoy 'tenure security and stable rents'. This kind of state intervention has always been controversial. Obviously, the mere fact that tenants appreciate tenure security does not justify that the state imposes it by law. As with any other good, one might expect the market to provide long–term contracts with tenure security if the willingness to pay is large enough to cover the cost of provision. However, this intuition may be misleading if tenants are heterogeneous and information is asymmetric.

Assume that some tenants are more difficult to deal with than others, but a landlord will not be able to identify them for sure when filling a vacancy. During the course of tenure, he will learn about the true service cost of his tenant. With a long–term contract, the landlord has to put up with a high service cost until the tenant leaves voluntarily. To the extent that service costs are noncontractible, they will not amount to a clear cut breach of contract. However, with a short–term contract, the landlord may evict bad tenants or raise their rent. This explains why longstanding tenants tend to pay less than those who entered their contract more recently. By granting a tenure discount, landlords try to reduce the turnover of good, i.e. 'low cost' tenants.

With tenure security, all tenants are treated alike, whereas high–cost tenants expect a higher probability of eviction or rent increases than low-cost tenants when entering a short–term contract. Hence, contracts offering tenure security are particularly attractive for high–cost tenants and will, therefore, suffer from adverse selection. Or to put it the other way around, low cost tenants have an incentive to differentiate themselves from high cost tenants by foregoing tenure security. By accepting the risk of eviction, they will substantially reduce their rent because landlords anticipate that only good tenants will do so. However, the rent for high–cost tenants will increase

accordingly. This redistribution among tenants is achieved at some cost, the moving cost in case of eviction, but eviction serves no social aim since the evicted tenant rents from another landlord anyway. Due to adverse selection, the private cost of providing tenure security surmounts the true social cost. Hence, in equilibrium, the provision of tenure security is too low (Hubert (1995)).

While this claim of market failure is fairly robust, it does not imply that making protection against eviction mandatory for all leases is warranted. If one accounts for genuine cost of providing tenure security, resulting, for example, from risk-aversion on part of the landlords, impaired incentives to keep service cost low on part of the tenants, etc., such a drastic intervention may be too much of a therapy, forcing tenants to pay a premium for the insurance which surmounts their valuation of it.

Long term contracts have to make some provisions for rent reviews. Moving cost and ex–post indivisibility are features of the housing market which create a strong interest for ex–ante insurance against ex–post price uncertainty. Suppose a tenant selects the optimal size for his new home at current rents. After moving in, he cannot change his housing consumption — except by moving again to a smaller or larger dwelling or by subletting part of his flat, which entails a substantial loss of privacy. Thus, there are discrete and non–trivial costs of adjusting consumption in a response to a change of price in the housing market. In contrast to most other goods, the consumption of which can be adjusted on short notice at little cost, uncertainty over future rents translates into a kind of income risk for immobile households. With housing consumption fixed, an increase of rent automatically decreases net of rent income available for other expenditures. In fact, the same holds true with opposite sign for many landlords.

If landlords and tenants negotiate a long–term contract, they have an interest to protect themselves against the vagaries of market rents for new leases — at least to the extent that these are not related to the cost of provision or the utility derived from consumption. Hence, it is their interest to fix the real rent in advance, isolating the contract from the development of the market for the duration of the term. In practice, their ability to do so may be limited, because the more rents for new contracts increase or decrease, the stronger becomes the interest of one side to renege on its promise. Hence, if contracts are incomplete, they can only provide partial insurance, for example, limiting the time for which the rent is fixed, or by

providing some flexibility through indexing.

Again, one may raise the question whether decentralized contracting achieves efficiency. Before doing so it is worthwhile to recall one of the most basic arguments against rent control: those who are lucky to be rationed in, usually the sitting tenants at the time of the introduction of rent control, obtain housing exceptionally cheap. Those who are unlucky to be rationed out experience greater hardship than necessary, because the protected 'sitting birds' have little incentive to economize on space. Hence, the unequal treatment of otherwise equal tenants is not only unfair, but also inefficient.

However, a similar phenomenon will arise in almost any market in which exchange is governed by long–term contracts. In a smaller or greater measure, all forms of tenure inhibit the landlords' (or the tenants') immediate responses to market forces and new opportunities, because that is what they are for. Thus, private contracting will result in a situation similar to the one created by rent control. Tenants who have old contracts, at a time when the housing market tightens, will be in a favorable position compared to those who have to negotiate new contracts. Their incentive to move will decline and the turnover rate will drop as the market tightens. As the critics of rent control rightly pointed out, this will exacerbate the crisis and raise market rents for new leases in times of tight markets, by reducing the incentives to economize on space.

How does this compare to what a benevolent social planner would implement as an efficient solution? The socially optimal indexation has to strike a balance between the insurance provided by stable rents within the contracts and the stabilizing effect of a high turnover on future market rents. However, every single landlord–tenant pair is concerned only with individual risk–sharing within the contract and ignores the effect of their indexing rule on future equilibrium rents. Privately optimal contracts are generally not efficient, and if tenants are risk–averse with respect to market rents for new leases, private contracts provide too much insurance within the contract, resulting in too low a turnover and excessively volatile market rent (Hubert (1996)).

Ownership

By granting the occupant tenure security, giving him full control rights and making him residual claimant to the property value, ownership can, in principal, provide first–best incentives with respect to investment, maintenance and care. However, there are important practical limitations.

First, if several households share a common structure, then it is impossible to align residual control and income rights and give them to the occupant. In an apartment block, decisions regarding structure and site use cannot be separated for different flats. Hence, condominiums either severely curtail the property rights of the individual occupants, e.g. allow demolition and site redevelopment by majority voting, or run the risk of costly haggling. With respect to the common structure, the relation between a single occupant and the union of all other occupants shares many problems with tenant–landlord relation, which diminishes the appeal of ownership. As a result the ratio between multi–family and single–family houses (which in turn depends on land availability, climate, energy prices etc.) is a major determinant for ownership rates.

Second, since housing is highly durable, the property value is much larger than the monthly rental value. Less wealthy households will depend on outside financing for purchasing a house which suits their consumption needs. In this, they face two constraints: it is not possible to borrow large amounts against a pledge of future income, and it is not possible to borrow against the full property value of the home. The first constraint requires households to maintain a positive asset balance. The inability to borrow against human capital affects the pattern of life–cycle consumption in general. Young households consume less than they would like, given their expectations of future income growth. This would not cause particular distortions in housing consumption if one could borrow against the full value of the property. However, since ownership grants tenure security and residual control rights, a positive equity margin is required to maintain adequate incentives for investment on part of the occupant. If equity should become negative, it is the financiers who effectively end up as residual claimants on the property value without having control rights, unless the borrower defaults. Obviously, this would create incentive problems as to maintenance and care, which are worse than those in rental contracts. Under ownership,

security of tenure implies that the equity position of incumbent homeowners may deteriorate during a decline of house prices. But as long as they serve their mortgage, they are entitled to stay. It is only when they decide to move that financiers will require the usual equity margin for the new home. As we will discuss in the last section, this creates similar 'lock in effects' as with long term rental contracts. The possibility of deteriorating equity positions will be anticipated at the time of the purchase and be taken into account by demanding higher down payments. In a sense, financial contracts are as incomplete as rental contracts — they just present an alternative approach to solve the resulting incentive problems, which is, however, inferior, if not enough wealth can be pledged by the occupant. Limited wealth and constraints on borrowing against the property value will force many households to rent early on in their life cycle to save funds for the down payment (Artle & Varaiya (1978)). For poor households, the constraints on consumption may be so severe that they better forego the benefits of ownership for their whole life.

Third, ownership may force the occupant to take excessive risk. So far it has been taken for granted that housing finance is through debt contracts and not through equity participation. While this is true as a matter of fact, it can also be derived from our contracting problem. It is well known, from principal agent models of corporate finance, that debt financing provides higher powered incentives for value maximizing behavior than outside equity, while minimizing the agency costs of external financing. However, debt financing puts all the risk on the shoulder of the owner. As a result, the typical asset structure of home–owners is poorly diversified. Henderson & Ioannides (1983) and Fu (1991) provide an analysis of the trade–off between risk taking in ownership and the so called 'rental externality', showing the importance of risk–preferences for tenure choice.

Finally, transaction costs play to the disadvantage of owning. Given the large values involved, the documentation of titles to land and property is rather expensive in the case of transfers of ownership. It requires a longer period of staying to make these expenditures worthwhile. Since the benefits of ownership such as tenure security, the right to adapt the building to particular tastes, etc. are worth little if the household wants to move soon, while short–term rental contracts can be quite efficient if mobility costs are low, it is not surprising that there is a strong negative correlation between ownership and mobility.

Heterogeneity, Search, and Trading in Thin Markets

Given that housing is very heterogeneous and locally dispersed, it requires time and effort to become informed over the opportunities to trade. This raises the question of how the two sides of the market meet each other, determine the conditions of exchange and what this implies for the efficiency of average matches and the dynamics of the market. The issues are similar in the rental and the ownership market, but research interest in the former has focussed on static efficiency, whereas in the latter, dynamic implications attracted more interest.

Arnott & Igarashi (2000) develop the following analysis of the rental market. Upon entering the housing market, tenants collect information about available units. However, easily accessible information is insufficient to make the appropriate decision. Flats differ in too many aspects which can not be communicated. Other information is soft and has to be verified. Hence, only a small sub-set of vacancies is selected and visited, which requires time and effort. When the home-hunter finds a flat which suits his taste, he may accept it even if the price is somewhat higher than for other flats of the same category. The alternative would be to continue the costly search process. If there is plenty of housing on the market, tenants will be able to find a very good 'match' with reasonable effort. If only few units are vacant, search will be more difficult and tenants will put up with lower match–quality.

Since landlords understand that product differentiation, idiosyncratic tastes and lack of transparency gives them market power, they charge a rent above marginal cost. This reduces somewhat the chance to strike a deal within any given period of time. But they do not mind a slight increase in the vacancy spell, because a higher rent in the future will reward them for the lost income. These extra profits trigger market entry, and in the long run equilibrium 'excess' capacity will manifest itself in the form of vacant housing, not in form of higher profits.

However, as usual in models of monopolistic competition, it is not clear on a priori grounds whether capacity is in fact 'excessive'. A higher vacancy rate also has advantages. It increases the choice for the tenant and makes it easier for home-hunters to find units which suit their tastes; hence, it reduces search cost and improves the average quality of the matches. The trade–off, therefore, is between low rents and a large variety to choose from. When deciding upon the rent, every landlord wants to

exploit his market power, which suggests that rents and vacancy rates are too high. But on the other hand, with respect to the vacancy spell, he considers only the lost revenues and ignores that a vacant dwelling increases the search efficiency and match quality. This positive externality suggests that vacancy rates and rents may also be too low in equilibrium. Arnott & Igarashi (2000) developed a formal model in which the first effect dominates the second under fairly general assumptions. This implies that the 'natural vacancy' rate and equilibrium rents are too high. A small decrease of rents below their long run equilibrium would, therefore, be welfare improving.

The basic story is the same for home owners (Wheaton (1991)) — only that most of them are repeat buyers, hence active on both sides of the market. As sellers, they face the same trade–off as landlords do: by raising the listed price, they decrease the arrival rate of prospective buyers, but increase the chance of selling at a higher price. As buyers, however, they will be cautious to strike a deal unless they have found a buyer for their old house. Owning two houses will put a heavy strain on their financial means. On the other hand, if a particularly good opportunity to buy comes along, then the would–be–mover becomes eager to sell and therefore decreases his listing price. Hence, given the intransparencies of the market we can expect different listing prices for houses of the same intrinsic value.

Dynamics of Prices, Turnover and Vacancies

Housing is one of the most important assets in any economy. Not surprisingly, house price studies have a long history. Initially, the focus of the interest was on the explanation of prices from features of the property, such as location, size, amenities, age, etc. More recently, the dynamics of housing prices attracted a lot of interest. With immediate adjustment, prices would always reflect all the currently available information, and price changes could be attributed to the arrival of new information. As in markets for financial securities, 'efficiency' would require housing prices to follow some sort of random walk; otherwise, past prices would contain information on future prices which are not incorporated in the current price. At the same time, the price of housing should always equal the capitalized rental income it generates.

However, empirical studies found strong evidence that the housing market deviates from this benchmark: there appears to be substantial inertia in price movements;

prices fail to fully incorporate predictable movements in real interest rates and deviate systematically from capitalized rent. High transaction costs may explain why the market fails to adjust swiftly to equilibrium, but the empirical evidence is also compatible with rational 'bubbles' or irrational formation of expectations. In the fast, flexible and transparent world of financial securities, significant serial correlation would, in principle, allow highly profitable trading strategies. Not so in housing markets where arbitrage is restricted by transaction cost, liquidity constraints, the absence of future markets and short sales, informational asymmetries, and the time it takes to gather and aggregate information and to finally complete a transaction.

Of this long list of particularities, liquidity constraints appear to be the most interesting ones. As has been argued above, it is vital to maintain a positive equity margin in order to provide incentives for proper maintenance, care etc. if the value of the asset depends on non–contractible effort of its occupant. Hence, the purchase of a house typically requires a significant down payment, and as a rule, for repeat buyers, proceeds on the sale of the old home contribute a substantial fraction of this expense. Once a substantial part of wealth is tied up in housing, an initial decline of housing prices impairs the ability of some would–be movers to make the down payment on new homes (Stein (1995)).

Consider a change of fundamentals leading to a decline of housing prices. There are three possibilities depending on the size of the outstanding old mortgage. If the old mortgage is small, the impact on liquidity is weak, so that the household's choice of the size of the new house is not distorted. The group of unconstraint movers will increase its housing consumption in response to a decrease in housing prices — the usual effect of price on demand. Households with an intermediate loan to value ratio, however, may find their ability to finance their optimal housing consumption impaired by insufficient funds for the down payment. If they decide to move, they will be forced to consume less than they would like if not for the liquidity constraints. Note that this story depends critically on imperfections in the rental housing market. Otherwise, financially constrained households would switch to renting. They would suffer from a loss of wealth on their investment, but there would be no need to put up the additional burden of distorting housing consumption. If rental housing is only an imperfect substitute for ownership, then the housing demand of constrained movers declines as prices decrease because their financial constraints tighten. This

will not only exacerbate the change in price needed to bring about a new equilibrium. If the group is large, aggregate demand may even decline over some range, raising the possibility of multiple equilibria. This may explain why small changes in the fundamentals can lead to dramatic shifts in the equilibrium prices. Finally, highly indebted households will be better off by foregoing the gains from moving and staying in their current homes. They will be 'locked in' by lack of equity. As prices decline, more households will come into this position, which explains why the volume of sales falls in declining markets.

If we combine the analysis of liquidity constraints with pricing behavior in search markets, the impact on prices will probably be somewhat smaller, while the impact on volumes will be larger. Recall that sellers face a trade–off between selling fast and achieving a high price. Constrained movers and locked–in household have less incentive to sell fast and increased incentives to set high listing prices. In particular, for the latter, 'fishing' has little opportunity cost, because they cannot move at all if they do not reach an exceptionally high price. Overall, the theory predicts a positive correlation between listing prices, final selling prices, time to sell and the loan to value ratio. See Genesove & Mayer (1997) for further intuition and empirical evidence. On the aggregate level, the more indebted home owners are, the more volatile housing prices and sales volume will be. However, the magnitude of the impact depends not only on the average debt level but also on the distribution of debt. A large number of households having moderate loan to value ratios may have a stronger impact than a few with extreme ratios, because the latter may be 'locked in' in declining markets while the former will move, but demand less due to liquidity constraints.

The theory of housing market dynamics in the presence of borrowing constraints, adjustment cost, etc. is still in its infancy, and many interesting questions are still left for research. For example, I am not aware of a welfare assessment of decentralized mortgage financing. Drawing on the analogy with long–term rental contracts, however, one may suspect that the debt level will be inefficiently high, because individual pairs of homeowners and mortgage lenders do not take into account the impact of their agreements on aggregate house–price volatility. It would also be interesting to contrast the turnover dynamics of the ownership market with those of the rental market. If the latter is characterized by long–term arrangements, then an

increase of rents decreases the rate of turnover, because sitting tenants have lower incentives to move. In the ownership market, an increase of prices relaxes financial restrictions of repeat buyers, which tends to increases the sales volume. Hence, both dynamics go into opposite directions, but we should observe less change of tenure. Potential first time buyers who are currently renting will be protected by favorable contracts and, at the same time, miss out on the value increase, hence, they will have less incentive and less opportunity to switch to owner occupation.

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