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# CONTRACT TYPES IN THE PROPERTY MARKET

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**ABSTRACT**

Because of extreme complexity of housing capital, it is difficult to specify the level and quality of housing investment in a legally binding contract. This paper studies relative merits of various contract types when complete contingent contracts are impossible. Contract types considered in this paper are purchase contracts, rental contracts of land, and rental contracts of housing, where the degree of security of tenure is an important choice variable in rental contracts. We focus on two characteristics of the property market: durability of housing capital and the moral hazard problem in housing maintenance.

## 1. Introduction

A variety of contract types exist in the property market. For example, a household can choose among buying a house, renting a house, and building a house on rented land.[2] In rental contracts, the degree of security of tenure is also an important choice variable. Concerning security of tenure, many countries restrict the liberty of contract. In Japan, for example, a special law exists which gives a tenant security of tenure even if he or she explicitly renounces the right in a written contract. In many other countries, the restriction of the liberty of contract is not as extreme as in Japan, although it is common for residential properties.

Choice between buying and renting has been the focus of extensive literature on tenure choice, and Weiss (1978) and Henderson and Ioannides (1983) among others provide excellent theoretical analysis of tenure choice. They do not however pay much attention to the structure of each type of contract. For example, the issue of security of tenure is ignored in their analysis. The reason for this is that they are not explicit about the informational problems that give rise to incompleteness of contracts. If a complete contingent contract can be written and enforced, contract types do not matter at all. That is, they all yield the same Pareto optimal allocation. Only in a more realistic world with incomplete information, choice among different contract types becomes a nontrivial problem. The purpose of this paper is to compare the performance of various contract types when a complete contingent contract is impossible due to transaction costs and informational asymmetry.

An important feature of our model is that incompleteness of contracts is combined with durability of housing capital. Because of durability, future benefits of housing investment as well as its current benefits must

be properly taken into account in the current decision. This gives the contracting parties an incentive to specify the level (and quality) of housing investment in the contract. We assume, however, that a contract cannot specify housing investment. This assumption reflects the fact that the complexity of actual housing investment makes it almost impossible to write a legally enforceable contract on the details of housing investment.

Because of this incompleteness of contracts, security of tenure becomes an important issue. For example, consider a rental contract of land where the renter makes housing investment. In this case, his investment decision will be seriously distorted if he has no security of tenure. Because the tenant has to return the land to the owner whenever the owner wants it back, the investment decision will be too myopic. In the case of a rental contract of housing where the owner makes housing investment, the opposite result will be obtained: the owner behaves myopically if the tenant has perfect security of tenure.

It is shown that a purchase contract yields the first best allocation even if a contract cannot be written on housing investment. A rental contract of land also achieves the first best level of investment if the renter is given perfect security of tenure and if he is allowed to sublease the land freely. This contract type is however equivalent to selling the land, which would provide an explanation of the fact that a rental contract of land is virtually non-existent in many western countries and that even in Japan the rental market is quite small. In contrast to a rental contract of land, a rental contract of a house will be inefficient if the security of tenure is perfect. Only when the tenant has no security of tenure, the owner's investment decisions will become efficient in this case.

Thus, concerning investment decisions, all three forms of contracts

achieve an efficient outcome if the degree of security of tenure is appropriately chosen. Since transaction costs are highest for purchase contracts and lowest for rental contracts of housing, this makes the rental contract most advantageous. Rental contracts of housing, however, have the well-known moral hazard problem (which is called the rental externality by Henderson and Ioannides (1983)). Compared with an owner-occupant, the tenant tends not to take a good care of a house, which leads to excessive deterioration of the quality of housing.

We examine the sources of the rental externality and show that it is not informational asymmetry between the owner and the tenant that creates the problem. Rather, the source is the lack of third party verifiability. That is, even if the two parties know the maintenance level, a third party, e.g., the court, may not be able to verify it. Without verification by the court, a contract on maintenance cannot be legally enforced.

Although we consider a single landowner, we assume that she is in a competitive environment and is faced with a horizontal demand curve. By this assumption, we avoid the issues treated in the durable-goods monopolists literature, e.g., Coase (1972), Bulow (1982), and Hart and Tirole (1988). If the landowner has monopoly power, the well-known results in the literature imply that the landowner favors renting over selling to restrict supply of land.

The organization of this paper is as follows. Section 2 formulates a two period model of durable housing investment. In Section 3, the first best allocation with full contract enforceability is characterized. Assumptions on transaction costs and contract structure are specified in Section 4. Sections 5, 6, and 7 examine purchase contracts, rental contracts of land, and rental contracts of housing, respectively. In

Section 8, we introduce maintenance decisions and analyze the rental externality. Section 9 contains concluding remarks.

## 2. The Model

Consider a plot of land owned by an absentee landowner who does not benefit from her own use of the land. She therefore has to sell or rent the land to another individual. We examine the owner's choice among various contract types: outright sale of the land, a rental contract of the land, and a rental contract of a house after building a house on the land. In a rental contract, a choice must be made concerning the degree of security of tenure.

Initially, there is no house on the land, and a house is built in period 1. Investment in housing capital in period 1 is denoted by $H_1$. Further investment may be made to improve (or prevent deterioration of) the house in period 2. Net investment in period 2 is denoted by $h_2$, which means that housing capital in period 2 is $H_2 = H_1+h_2$. The costs of housing investment are given by $k(H_1)$ and $k(h_2)$, where we assume that $k()$ is convex and differentiable. For simplicity, we ignore depreciation of housing capital. We also assume that housing investment cannot become negative. These assumptions do not affect our results except in rental contracts of a house with perfect security of tenure. In contracts of this type, the owner cannot raise the rent unless the initial renter moves out. She may therefore want to lower the investment level as much as possible to induce the move. The fact that $h_2$ cannot be made negative puts a bound to this behavior.

Two types of potential residents exist. The property market is competitive in the sense that there are many households of both types who

compete each other for the land.

We assume that benefits that a resident receives from housing can be expressed in pecuniary terms.[3] This assumption is made to simplify the exposition and relaxing it does not affect most of the qualitative results. A household of type A obtains $u_A(H_1)$ of benefits in period 1 and $v_A(H_2,\theta)$ of benefits in period 2, where $\theta$ is a random variable representing uncertainty in demand conditions. The distribution of $\theta$ is denoted by $F(\theta)$ and we assume that everyone in the market knows $F(\theta)$. The corresponding benefit functions of a type B household are $u_B(H_1)$ and $v_B(H_2,\theta)$. In order to guarantee the existence and uniqueness of the solution, we assume that all the benefit functions are concave in housing capital, $H_1$ and $H_2$.

The benefit functions are normalized so that the benefit level that any potential resident obtains without the land is zero in each period. The equilibrium price of land (or the rent of land or a house) then equals the highest bid price with zero benefit levels.

Both types have the same discount factor $\rho$. If, for example, a household of type A occupies the house for two periods, the discounted sum of benefits net of the costs of housing investment is $u_A(H_1)-k(H_1)+\rho E[v_A(H_2,\theta)-k(h_2)]$, where E() denote expectation over $\theta$.

For simplicity, we assume that $u_B(H_1)$ is so small compared with $u_A(H_1)$ that a household of type A will always occupy the land in period 1. In general, the type of the resident in period 1 is determined endogenously and other cases are of course possible. Although details of equilibrium contracts will be different in those cases, our main results will not be changed. In period 2, a change in resident may or may not occur depending on the realized value of $\theta$.

Transaction costs which are different depending on contract types are

incurred when a contract is made. Assumptions on transaction costs and contract structure will be specified in Section 4.

### 3. The First Best Allocation with Full Contract Enforceability

Before examining equilibrium contracts, we derive the first best allocation. The first best allocation maximizes the return to the initial landowner under the assumption that the levels of housing investment are fully enforceable (i.e., a contract could specify $H_1$ and $H_2$, where $H_2$ could be contingent on the realized value of $\theta$, and they could be enforced without costs). Let c denote transaction costs for land.

In the first best world, all of the contract types that we will examine yield the same Pareto optimal allocation. In order to simplify exposition, however, we consider a rental contract of a house in this section.

By our assumption in the preceding section, a user of type A always uses the land in period 1 and the rent net of the investment costs is $u_A(H_1)-k(H_1)$ in period 1.

If the same user continues to rent the house in period 2, the maximum net rent in period 2 is $w_A(H_1,\theta) = \max_{\{h_2\}} \{v_A(H_1+h_2,\theta)-k(h_2)\}$. If the other type rents the house, the maximum net rent is $w_B(H_1,\theta) = \max_{\{h_2\}}\{v_B(H_1+h_2,\theta)-k(h_2)\}$. When there is a change in the user, transaction costs of c are incurred. Hence, in order to maximize the second period net return, there should be a change in the user if and only if $w_A(H_1,\theta) < w_B(H_1,\theta)-c$. The expected value of the net return in the second period is then $V^*(H_1;c) = E[\max\{w_A(H_1,\theta), w_B(H_1,\theta)-c\}]$.

The optimal choice of $H_1$ maximizes the discounted sum of net rents, $u_A(H_1)-k(H_1)+\rho V^*(H_1;c)$. This choice yields the maximum return to the owner:

$$p^* = \max_{\{H_1\}} \{u_A(H_1) - k(H_1) + \rho V^*(H_1;c)\} - c.$$

## 4. The Structure of Contracts

If possible, the owner and the user would want the first period contract to specify housing investment in both periods. We assume however that the contract in period 1 cannot specify the levels of $H_1$ and $h_2$. This assumption is crucial for the following analysis, since without it there will be no essential difference between different contract types. If housing investment in both periods can be determined in period 1, a Pareto optimal investment levels will be chosen regardless of the type of contract. The reason is simple: otherwise, one of the parties can offer another contract which makes both sides better off.

The assumption that no legally binding contract is possible for the investment level can be justified when the costs of enforcing such a contract are very high. When one of the parties violates the contract, the other party has to go to the court to enforce it. For various reasons, the costs of legal enforcement may be too high to specify the level of housing investment in a contract. For example, time costs for both parties are not negligible and substantial fees must be paid to lawyers. Specifying housing investment in a legal contract is particularly costly because housing is an extremely complicated commodity.

Although the investment level cannot be specified in a legally binding contract, we assume that both the owner and potential residents can observe it. This assumption reflects the third party verifiability problem emphasized by Malcomson (1984), (1986) and MacLeod and Malcomson (1989). Even if the contracting parties can observe relevant characteristics of

housing investment, this does not mean that they can enforce a contract specifying them. Legal enforcement of a contract requires that its violation be verified by the court, which is often very difficult.

Note that our assumption is stronger than impossibility of state contingent contracts. In our model, a contract cannot specify housing investment even in the absence of uncertainty. Because of this assumption, efficient investment will be possible only if the party that undertakes investment fully receives its marginal benefits. For example, if the owner of a rental housing cannot raise the rent when she improves the quality of housing, her investment decision will be inefficient.

Furthermore, because of durability of housing capital, the investment decision in the current period must reflect future benefits as well as current benefits. In our model where a change in occupant is desirable in some states of nature, the benefits that accrue to a new occupant must be taken into account in addition to those to the present occupant. This further restricts the form of a contract that ensures efficient housing investment.

A contract is signed at the beginning of each period. In period 2, a contract is negotiated after the realized value of random variable $\theta$ is observed. In purchase contracts and rental contracts of land, housing investment is chosen after the contract is signed. This reflects our assumption that a contract cannot specify the level of housing investment. In rental contracts of a house, however, prospective renters can usually observe the level of housing investment before signing a contract. We therefore assume that in this type of contracts investment is chosen before the contract is signed.

Transaction costs are different depending on contract types for various

reasons. Most important in many countries (especially in Japan) are tax provisions. For example, many countries have a tax on realized capital gains. Since a capital gains tax is levied only when land (or a house) is sold, this tax raises transaction costs for purchase contracts but it does not change those for rental contracts. Transaction costs are therefore highest for purchase contracts and lowest for rental contracts of housing, where those for rental contracts of land usually lie between the two. The transaction costs are always incurred in the first period, but they will not be incurred in the second period if the same resident occupies the house for two periods.

## 5. Purchase Contracts

First, consider a purchase contract where a resident purchases land to build his house. In the second period, the resident can sell the house (including land) if he wants to. It is easy to show that housing investment is efficient in this case. The reason is rather obvious. Housing investment benefits the current resident and a future resident. If the resident does not sell the house, he receives the benefits of the house in both periods. Because he makes the investment decision, housing investment fully reflects his own benefits. If the resident sells the house, the buyer of the house will benefit from the investment, but the market price of housing in the second period will reflect this benefit. The benefits of investment are therefore fully captured by the present resident and his investment decision is efficient.

Let $c^S$ denote transaction costs for sale of land, and let $p_1$ and $p_2$ denote the prices of land (net of transaction costs) in periods 1 and 2 respectively. Since a house is built in period 1, the price in period 2

includes the value of the house. The buyer of the house will make further investment, $h_2$, in the second period. The bid price of a type i (= A or B) household is then $\max_{\{h_2\}}\{v_i(H_1+h_2,\theta)-k(h_2)-c^S\} = w_i(H_1,\theta)-c^S$, where $w_i(H_1,\theta)$ is the maximized net benefit defined in Section 3. Because of transaction costs, the house will never be sold to another type A household. Hence, without losing generality we can assume that the price in period 2 is the bid price of type B households, $p_2 = w_B(H_1,\theta)-c^S$.

The resident sells the house in period 2 if the net resale price, $p_2$, exceeds his reservation price, $w_A(H_1,\theta)$, i.e., if $w_A(H_1,\theta) < w_B(H_1,\theta)-c^S$. Hence, the discounted net payoff for the resident is $u_A(H_1)-k(H_1)+\rho V^*(H_1;c^S)$, where $V^*()$ is defined in Section 3. Housing investment in period 1 is chosen to maximize this discounted payoff, and the price of land in period 1 is $p_1 = \max_{\{H_1\}}\{u_A(H_1)-k(H_1)+\rho V^*(H_1;c^S)\}-c^S$. Thus, given the transactions costs $c^S$, the purchase contract achieves the first best allocation.

## 6. Rental Contracts of Land

In a rental contract of land, a user rents land and constructs a building there. Although many types of rental contracts are possible, we examine only two polar cases: one with no security of tenure and the other with perfect security. With no security of tenure, the owner solicits rental offers in period 2, and the tenant has to return the land to the owner unless he can match the highest offer. With perfect security of tenure, the tenant can continue renting the land so long as he pays the rent which is determined in period 1.

Transaction costs for a rental contract of land are denoted by $c^r$. In

order to avoid unnecessary complications, we assume that the bid rent of type B households is always nonnegative in the second period, i.e., $w_B(H_1,\theta) - c^r \geq 0$ for any $\theta$.

### 6.1. No Security of Tenure

If a renter has no security of tenure, there will be bidding for the land at the beginning of period 2 and the owner rents the land to the highest bidder. Since the presence of transaction costs makes the bid rent of the initial renter higher than that of other households of the same type, a household of type A will never outbid the initial renter. Hence, unless the bid rent of type B households is higher than the bid rent of the initial renter, he will continue to rent the house. Otherwise, the land will be rented to a household of type B.

When the initial renter continues to rent the land, there is ambiguity about the second period rent. In this case there is no reason to suppose that the equilibrium rent equals the bid rent of the initial renter. In fact, because the initial renter does not have to pay transaction costs $c^r$, his bid rent may be strictly higher than the highest bid from others. In such a case the second period rent can take any value between these two bid rents depending on the bargaining power of the owner and the renter. For simplicity, we examine two polar cases.

First, if the renter has no bargaining power, the second period rent is $r_2 = \max \{w_A(H_1,\theta), w_B(H_1,\theta)-c^r\}$, and the initial renter's net payoff in the second period is always zero. Because the initial renter does not receive benefits of the investment in the second period, his investment decision in period 1 is completely myopic. Housing investment in this case is therefore inefficiently low.

Second, consider the case where the owner has no bargaining power. The second period rent in this case is $r_2 = \max\{w_A(H_1,\theta)-c^r,\ w_B(H_1,\theta)-c^r\}$. If the initial renter continues to live in the house, the net payoff in period 2 for the renter can be positive, though it cannot exceed the transaction costs $c^r$. If $w_A(H_1,\theta) \geq w_B(H_1,\theta)$, then the payoff is $c^r$, and if $w_B(H_1,\theta)-c^r < w_A(H_1,\theta) \leq w_B(H_1,\theta)$, then it is $w_A(H_1,\theta)-[w_B(H_1,\theta)-c^r]$. The expected net payoff in period 2 for the initial renter is then

$$
\begin{aligned}
(6.1)\quad & V^n(H_1;c^r) \\
& \equiv c^r \text{Prob}\{w_A(H_1,\theta) > w_B(H_1,\theta)\} \\
& \quad + \int_{\{w_B(H_1,\theta)-c^r < w_A(H_1,\theta) \leq w_B(H_1,\theta)\}} \{w_A(H_1,\theta)-[w_B(H_1,\theta)-c^r]\}dF(\theta),
\end{aligned}
$$

where recall that $F(\theta)$ is the distribution of $\theta$. The discounted sum of payoffs for the two periods is then $u_A(H_1)-k(H_1)-r_1-c^r+\rho V^n(H_1;c^r)$. The initial renter chooses $H_1$ to maximize this discounted payoff.

In this case, too, the choice of $H_1$ by the renter is myopic because he does not receive most of the benefits that arise in period 2. Let us first consider a special case where type B households are identical to type A households: $w_A(H_1,\theta) = w_B(H_1,\theta)$. In this case, the second period payoff for the renter always equals the transaction costs $c^r$ and does not depend on the first period investment. Hence, the first period investment $H_1$ will be chosen to maximize the first-period payoff only.

In a general case, $V^n(H_1;c^r)$ satisfies

$$
\begin{aligned}
(6.2)\quad & \frac{\partial}{\partial H_1} V^n(H_1;c^r) \\
& = c^r \frac{\partial}{\partial H_1} \text{Prob}\{w_A(H_1,\theta) > w_B(H_1,\theta)\} \\
& \quad + \frac{\partial}{\partial H_1} \int_{\{w_B(H_1,\theta)-c^r < w_A(H_1,\theta) \leq w_B(H_1,\theta)\}} \{w_A(H_1,\theta)-[w_B(H_1,\theta)-c^r]\}dF(\theta) \\
& = \int_{\{w_B(H_1,\theta)-c^r < w_A(H_1,\theta) \leq w_B(H_1,\theta)\}} \frac{\partial}{\partial H_1}[w_A(H_1,\theta)-w_B(H_1,\theta)]dF(\theta).
\end{aligned}
$$

This derivative can be either positive or negative. Hence, $H_1$ can even be smaller than the completely myopic level. The reason is that an increase in $H_1$ will raise the bid rent of type B households as well as that of the initial renter. If the former rises more than the latter, an increase in housing investment reduces the utility of the initial renter.

### 6.2. Perfect Security of Tenure

Next, let us turn to the case where the renter has perfect security of tenure. In this case, the rents in the two periods, $(r_1, r_2)$, are set in period 1 and will not be changed so long as the initial renter continues to rent the land. If there is a change in renter, however, the rent in period 2 may be raised. The renter has the perfect security of tenure in the sense that, if he pays the predetermined rents, he will never be evicted. We first examine the case where the renter is allowed to sublet the land.

#### (i) Subleasing Allowed

If subleasing is permitted, a rental contract can be designed to work exactly as a purchase contract. If the owner sets the second period rent equal to zero (and raises the first period rent accordingly), the renter will act in exactly the same way as a purchaser of land. Since a purchase contract achieves the first best outcome (conditional on transaction costs), a rental contract of land also attains the first best if subleasing is allowed.

In our model, the first best outcome maximizes the expected return to the initial owner. Hence, the owner will permit subleasing, if he is given a choice at the time of contracting. This ex ante preference for permission of subleases should not be confused with ex post preferences, however. If

the owner is allowed to change the contract in the second period, he will of course prefer to disallow subleasing.

Formal derivations of these results are straightforward and omitted.

**(ii) No Subleasing**

Next, suppose, for some reason, subleasing is not allowed. In this case, it is possible that the second period rent is sufficiently high so that for some values of $\theta$ the renter will return the land to the owner in the second period. We assume that the owner is not bound by the original offer of the second period rent, $r_2$, when there is a change in the renter. This assumption reflects the fact that a contract which is signed between the owner and the original renter will not bind the relationship between the owner and the new renter.

If $w_A(H_1,\theta)-r_2 < 0$, then the initial renter will stop renting in the second period. The expected net payoff in period 2 for the renter is then $V^r(H_1,r_2) \equiv \text{Emax}\{w_A(H_1,\theta)-r_2, 0\}$. The renter chooses $H_1$ to maximize $u_A(H_1) -k(H_1)-r_1+\rho V^r(H_1,r_2)$. Denote the choice by $H_1^{r*}(r_2)$. The choice of $H_1$ by the renter is inefficient, since he does not receive benefits from $H_1$ in the second period if he moves out.

Since the rents are determined in such a way that the discounted sum of payoffs for the renter is zero, the first period rent must satisfy

$$(6.3) \qquad r_1 = [u_A(H_1^{r*}(r_2))-k(H_1^{r*}(r_2))] + \rho V^r(H_1^{r*}(r_2),r_2) - c^r.$$

The right hand side of this equation is a function of $r_2$ which we denote by $r_1^{r*}(r_2)$. The expected return to the owner is then

$$(6.4) \quad p^r = r_1^{r*}(r_2) + \rho\{r_2+\int_{\{w_A(H_1^{r*}(r_2),\theta)<r_2\}} [w_B(H_1^{r*}(r_2),\theta)-c^r-r_2]dF(\theta)\}.$$

The owner chooses the second period rent, $r_2$, to maximize this expected

return. Unlike in the case where subleasing is allowed, it is not optimal for the owner to set $r_2 = 0$. The reason is that a rise in $r_2$ increases the probability that a change in the renter occurs. The owner gains from a change in the renter because he can then raise the land rent.

Thus, in rental contracts of land prohibition of subleases will cause inefficient housing investment. The owner has an incentive to set a high second period rent to induce the renter to stop renting in the second period. The first period housing investment by the renter is suboptimal because, if he moves out, he does not receive its benefits in the second period.

## 7. Rental Contracts of Housing

Next, consider rental contracts of housing, where the owner makes housing investment $H_1$ and $h_2$ and rent the house (including both land and structure) to a renter. We assume that the renter is not allowed to make housing investment. As in the preceding case, various cases are possible depending on the degree of security of tenure. We examine two polar cases, one with no security of tenure and the other with perfect security.

### 7.1. No Security of Tenure

Assume first that the renter has no security of tenure in the sense that he must move out when the owner finds another renter who is willing to pay a higher rent. Furthermore, we assume that the owner knows the preferences of possible renters so that he can choose H's optimally. Transaction costs for a rental contract of housing are denoted by $c^R$.

The sequence of decisions undertaken in period 2 is as follows. First, $\theta$ is observed. Based on the realized value of $\theta$, the owner decides housing

investment $h_2$. Prospective renters calculate their bid rents after observing $h_2$ and place bids for the house. The house is rented to the highest bidder.

The bid rent of type A households (other than the initial renter) is $v_A(H_2,\theta)-c^R$, and the bid rent of type B households is $v_B(H_2,\theta)-c^R$. The initial renter does not have to pay transaction costs and his bid rent is $v_A(H_2,\theta)$. Hence, if $v_A(H_2,\theta) \geq v_B(H_2,\theta)-c^R$, the same renter will continue to rent the land in the second period, and otherwise a type B household will become a new occupant. In the latter case, the rent is $v_B(H_2,\theta)-c^R$, but in the former case the rent depends on the bargaining power of the owner and the renter.

Let us first consider the case where the renter has no bargaining power. In this case the renter's net payoff is zero in the second period and the second period rent is $R_2 = \max\{v_A(H_2,\theta),\ v_B(H_2,\theta)-c^R\}$. After paying for housing investment, the net return to the owner is then $r_2 = \max\{w_A(H_1,\theta),\ w_B(H_1,\theta)-c^R\}$, where $w_A()$ and $w_B()$ are defined in Section 3. Notice that the choice of $h_2$ is the same as in previous cases.

Next, the rent in period 1 is determined in such a way that the payoff for the initial renter is zero: $R_1 = u_A(H_1)-c^R$. Since the rent net of the costs of housing investment is $r_1 = R_1-k(H_1)$, the discounted net payoff for the owner is

$$r_1 + \rho E(r_2) = u_A(H_1) - k(H_1) - c^R + \rho V^*(H_1;c^R), \tag{7.1}$$

where $V^*()$ is the same function as that obtained in the first best solution. Hence, the choice of first period investment $H_1$ is the same as the first best solution. Thus, in a rental contract of housing, allowing no security of tenure yields the first best solution.

So far we have assumed that the initial renter has no bargaining power

in the second period. If the initial renter has some bargaining power, the owner's second-period investment will no longer be optimal. The reason is that the renter captures part of the benefits of the investment. Suppose, for example, the owner has no bargaining power. Then, in the event where $v_A(H_2,\theta) > v_B(H_2,\theta)-c^R > v_A(H_2,\theta)-c^R$, the rent will be $R_2 = v_B(H_2,\theta)-c^R$ and the owner maximizes $v_B(H_2,\theta)-c^R-k(h_2)$ instead of $v_A(H_2,\theta)-k(h_2)$. As the transaction costs tend to zero, however, this distortion will disappear. Because transaction costs for rental housing are relatively small, this problem will not be important in most cases.

We have assumed that the tenant does not make any housing investment. Quite often, however, this is not true. For example, the tenant must usually invest in interior decoration which is specific to the house. In such a case, giving no security of tenure makes the tenant's investment decision inefficient.

Our analysis suggests, however, that transaction costs including search and moving costs do not by themselves justify the protection of security of tenure. Even though our model has transaction costs, the first best allocation is attained in the case of no security of tenure.

### 7.2. Perfect Security of Tenure

Next, consider the case where a renter has perfect security of tenure. As in Section 6, we assume that so long as the renter pays the predetermined rents, $R_1$ and $R_2$, he will never be evicted. The second period rent cannot therefore be raised unless the initial renter moves out. The rent can be lowered, however, if the owner wants to. Such a case may occur when not only the bid rent of the initial renter but also that of a household of the other type is lower than the predetermined rent, $R_2$. The rent in period 2

may be raised if there is a change in the renter.

The sequence of decisions in period 2 is as follows. First, everybody observes $\theta$. The owner then decides housing investment $h_2$. Next, the renter decides whether or not to move out of the house. If the renter decides to remain in the house, he pays the rent. If he moves out of the house, the owner can make further investment $\tilde{h}_2$. She then rents the house to the highest bidder.

In order to save space, we concentrate on the case where subleasing is not allowed. The analysis of the other case is similar and we later comment on the results briefly.

Depending on the relationship among $R_2$ and the bid rents of type A and type B households, three cases will occur.

First, if the bid rent of the initial renter is higher than $R_2$ at $h_2 = 0$ (i.e., $v_A(H_1,\theta) \geq R_2$), then the initial renter will never move out. In this case the owner has no incentive to invest in housing in period 2 because investment has no effect on the rent. Hence, if $v_A(H_1,\theta) \geq R_2$, then $h_2 = 0$ and the net return to the owner is $R_2$.

Next, if $v_A(H_1,\theta) < R_2$ and if the owner makes no investment in the second period, then the initial renter will move out. The owner can then raise the rent if the bid rent of type B households is sufficiently high. Before renting the house, the owner can make further investment, $\tilde{h}_2$. The optimal choice of $\tilde{h}_2$ is obtained by maximizing the net return, $v_B(H_1+\tilde{h}_2,\theta)-k(h_2)-c^R$. The maximum return to the owner is $w_B(H_1,\theta)-c^R$, where $w_B(H_1,\theta)$ was defined in Section 3. If this return is higher than $R_2$, then it is optimal for the owner to let the initial renter to move out.

Thus, if $v_A(H_1,\theta) < R_2$ and $w_B(H_1,\theta)-c^R \geq R_2$, then $h_2 = 0$ and the house is rented to a type B household in period 2. In this case, the net return

to the owner is $w_B(H_1,\theta)-c^R$.

If $v_A(H_1,\theta) < R_2$ and $w_B(H_1,\theta)-c^R < R_2$, it may not be optimal for the owner to let the initial renter move out. The owner must then choose between keeping and not keeping the initial renter. Let us first consider the two choices separately.

In the first choice, the owner must lower the rent and/or make investment in the second period in order to prevent the renter from moving out. The net return to the owner in the second period is then $\min\{R_2, v_A(H_1+h_2,\theta)\}-k(h_2)$. The owner chooses $h_2$ to maximize this net return. Let $\hat{h}_2(R_2,H_1,\theta)$ denote the level of the second period investment which makes the bid rent of the initial renter equal to $R_2$, i.e., $v_A(H_1+\hat{h}_2(R_2,H_1,\theta),\theta) \equiv R_2$. Furthermore, let $h_2^*(H_1,\theta)$ denote the second period investment that maximizes the bid rent net of the investment cost, i.e., $h_2^*(H_1,\theta) = \text{argmax}_{\{h_2\}}\{v_A(H_1+h_2,\theta)-k(h_2)\}$. Then, it is not difficult to see that the solution to the owner's maximization is $\min\{\hat{h}_2(R_2,H_1,\theta), h_2^*(H_1,\theta)\}$. If the optimal investment is $\hat{h}_2(R_2,H_1,\theta)$, then the rent is $R_2$ and the net return to the owner is $R_2-k(\hat{h}_2(R_2,H_1,\theta))$. Otherwise, the owner lowers the rent to $v_A(H_1+h_2^*(H_1,\theta),\theta)$, and the net return to the owner is $w_A(H_1,\theta)$.

In the second choice, the new renter may be a type B household or a type A household. The maximum return that the owner can obtain is then $\max\{w_A(H_1,\theta)-c^R, w_B(H_1,\theta)-c^R\}$.

Comparing the first and second choices, we can see that if $h_2^*(H_1,\theta) \leq \hat{h}_2(R_2,H_1,\theta)$, then the maximum return to the owner is $\max\{w_A(H_1,\theta), w_B(H_1,\theta)-c^R\}$, and that otherwise the maximum return is $\max\{w_A(H_1,\theta)-c^R, w_B(H_1,\theta)-c^R, R_2-k(\hat{h}_2(R_2,H_1,\theta))\}$. Thus, a variety of cases are possible

depending on the values of $R_2$, $c^R$, $H_1$, and $\theta$.

Let us now summarize the optimal policy of the owner in the second period. First, if $v_A(H_1,\theta) \geq R_2$, then $h_2 = 0$. In this case the initial renter will not move out and the net return to the owner is $R_2$. Second, if $v_A(H_1,\theta) < R_2$ and $w_B(H_1,\theta)-c^R \geq R_2$, then $h_2 = 0$ and the initial renter will move out. The owner then makes housing investment and rents the house to a type B household. In this case, the net return to the owner is $w_B(H_1,\theta)-c^R$. Third, if $v_A(H_1,\theta) < R_2$ and $w_B(H_1,\theta)-c^R < R_2$, then the owner may or may not let the initial renter move out. When the initial renter continues to rent the house, the owner lowers the rent and/or makes housing investment. If the initial renter moves out, the new renter can be of type A.

Thus, when the renter has perfect security of tenure, the second period investment is inefficiently low in some states of nature. For example, it is zero if the bid rent of the initial renter exceeds $R_2$ even with zero second period investment.

In the first period, the owner chooses $H_1$ and $R_2$ in such a way to maximize the expected value of the discounted sum of returns. This problem is quite tedious and we do not spell the details out here. However, it is obvious that the owner's choice does not in general coincide with the first best solution.

Next, let us briefly comment on the case where subleasing is allowed. When subleasing is allowed, the initial renter will move out only when the maximum of his own bid rent and the bid rent of type B households is less than the rent in period 2, i.e., $\max\{v_A(H_1,\theta), v_B(H_1,\theta)-c^R\} < R_2$. With this change, the analysis is the same as before. Hence, investment and moving decisions are inefficient also in this case. In fact, inefficiency due to suboptimal investment in the second period will be more severe than

before because the initial renter moves out less often. One implication of this result is that unlike in the land rental case the owner does not necessarily gain by the permission of subleasing.

## 8. Moral Hazard in Maintenance

We have seen that, given transaction costs, all three types of contracts can achieve the first best allocation when the degree of security of tenure is appropriately chosen. In rental contracts of land, an efficient allocation is obtained if the security of tenure is perfect and if subleasing is allowed. In rental contracts of housing, efficiency requires that the renter have no security of tenure.

Since transaction costs are usually lowest for rental contracts of housing, this result suggests that rental housing should be dominant. It should be noted, however, that the result is obtained in a very restrictive model. The most important omission is the moral hazard problem in housing maintenance emphasized by Henderson and Ioannides (1983). They claimed that a fundamental externality exists for the rental of housing. Careless use of housing will cause damages or increase wear and tear. For example, doors and window frames may be damaged when handled roughly, and floors may be stained unless cleaned often.

Although the rental externality of this sort certainly exists, its nature and sources have not been clearly identified. Let us first examine what sort of asymmetric information assumptions are required to produce the rental externality. Benefits for residents now include the maintenance levels of housing: $u_i(H_1,M_1)$ and $v_i(H_2,M_2,\theta)$ for i=A, B, where $M_t$ is the maintenance level in period t.

First, it is rather obvious that the rental externality will not arise

if maintenance has no long-term effects. That is, if the benefits of maintenance activities in period 1 do not spill over to period 2, the resident in period 1 will receive all the benefits of his maintenance efforts. Hence, he chooses the first best maintenance level.

More formally, this case assumes that the costs of maintenance are given by $k_M(M_t)$ for both periods (t=1,2). The tenant then chooses $M_1$ to maximize $u_i(H_1,M_1)-k_M(M_1)$, and chooses $M_2$ to maximize $v_i(H_2,M_2,\theta)-k_M(M_2)$. This yields the first best choice of $M_1$ and $M_2$.

Thus, the rental externality can arise only when maintenance efforts have long-term as well as short-term effects. We therefore assume that the second period maintenance level is $M_2 = M_1+m_2$, where $m_2$ is maintenance efforts in period 2. The costs of maintenance are $k_M(M_1)$ in period 1 and $k_M(m_2)$ in period 2. Although this formulation assumes that no depreciation occurs for maintenance, the same results will be obtained even if we introduce depreciation.

Now, if a rental contract can specify the maintenance levels that the tenant has to provide, then no rental externality arises. We therefore have to assume asymmetric information of some sort that makes it impossible to specify the maintenance levels. The first obvious candidate is asymmetric information between the owner and the tenant. If the owner cannot observe the maintenance level, then it is of course impossible for the owner to enforce it.

Asymmetric information between the owner and the tenant cannot, however, be the source of the rental externality. The reason is that the same informational asymmetry exists in the purchase contract. If the owner cannot observe $M_1$ in the case of a rental contract, then there is no reason to suppose that the buyer of a house can observe it. Hence, there is no

difference between a purchase contract and a rental contract.

Perhaps, the most attractive explanation of the rental externality is again the third party verifiability problem. As in the case of housing investment, a contract for housing maintenance is difficult to enforce because of the complexity of housing maintenance. Even if both the owner and the tenant can observe $M_1$, a contract which specifies the level of $M_1$ is not enforceable unless a third party such as the court can verity it.

In the case of a purchase contract, third party verifiability is not required. Because a potential buyer determines the bid price after observing the level of maintenance, there is no need to write a contract for maintenance. The owner/resident benefits from better maintenance, since a buyer will then offer a higher price. Thus, asymmetric information between the court and the two contracting parties can explain the difference between rental and purchase contracts.

If the third party verifiability problem exists, a rental contract no longer yields the first best allocation, since the tenant's maintenance decision is myopic. Part of the benefits of good maintenance will spill over to the second period, but that part will be captured by the owner in the form of a higher second period rent. Hence, the tenant will ignore the long-term benefits of maintenance.

## 9. Concluding Remarks

We have compared the performance of various contract types in the property market. Three major efficiency issues have been examined: transaction costs, durability of housing capital, and asymmetric information in maintenance. Transaction costs are lowest for a rental contract of housing and highest for a purchase contract, where a rental contract of land

lies between the two.

Concerning investment decisions, a purchase contract is efficient, but rental contracts can be efficient, too. We have shown that a rental contract of land yields efficient investment decisions if the renter has perfect security of tenure and if subleasing is allowed. This case is however virtually the same as a purchase contract. A rental contract of housing achieves efficient investment if the tenant has no security of tenure.

If the quality of maintenance is not verifiable by the court, then a rental contract of housing has the well-known moral hazard problem: the tenant does not take a sufficiently good care of the house. This yields a result which closely resembles the actual property market of most of the countries. Since a purchase contract is superior than others except in transaction costs, a purchase contract is chosen when a resident does not expect to move often. Also this result offers an explanation of the fact that owner occupancy is more common for detached housing than for multi-family housing. In the case of multi-family housing, maintenance can be centralized to take advantage of scale economy, and maintenance is more complicated for a detached house with a garden to take care of.

This paper also provides a basis for the analysis of desirable legal structure. According to our results, a tenant's right should not be heavily protected in the case of rental housing. For rental contracts of land, however, the opposite is true.

This paper is however only a starting point of the analysis of contract types in the property market, and many issues are left for future work.

First, our analysis does not provide much insight about the role of liberty of contract in the property market. In our model, there is no need

to restrict liberty of contract, since the most efficient contract will be chosen by the landowner. For a more meaningful analysis of this issue, it is necessary to extend our model to include asymmetric information between the owner and the tenant.

Second, management of rental housing requires skills and efforts. If the owner does not have the time or ability to manage rental housing, he may want to hire an agent to do the job. This creates an agency problem. An extension in this direction is necessary to analyze trust contracts which are becoming popular in Japan.

Third, in our two-period model difference between a purchase contract and a rental contract of land with perfect security of tenure is very small. This is caused by the fact that there is no more life after the second period. An extension to an infinite horizon model may provide clearer distinction between these two types of contracts.

Fourth, we assumed that the property market is competitive. Because of locational heterogeneity of land, however, the owner often has monopoly power at least to a certain degree. If the owner has monopoly power, our analysis must be combined with those in the literature on durable-goods monopolists such as Coase (1972) and Bulow (1982).

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## FOOTNOTES

[1]An earlier version of this paper was presented at the Regional Science and Urban Economics Workshop in Tsukuba. I thank the participants of the workshop for useful comments. I also thank Konrad Stahl and anonymous referees for helpful comments and suggestions.

[2]In many western countries, the last choice is virtually eliminated by their convention that a building and land are treated as a single property. In countries such as England and Japan, however, building a house on rented land is fairly common.

[3]This is equivalent to assuming that the utility function is quasi-linear, i.e., separable between housing and the composite consumer good and linear in the composite good.