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Japanese Housing Tenure Choice after the Revision of the Tenant Protection Law: Owned Houses, General Rental Houses and Rental Houses with Fixed Rental Term

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Abstract

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JEL classification: R21, C51, K12
Keywords: Housing tenure choice, Rental houses with fixed rental term, Japan, conditional logit, sample selection bias, compensating variation

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Japanese Housing Tenure Choice after the Revision of the Tenant Protection Law: Owned Houses, General Rental Houses and Rental Houses with Fixed Rental Term[†]

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Abstract

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1. Introduction

Should we buy houses or just rent them? Housing tenure choice is an important question, because housing is a basic necessity everywhere in the world. Tenure choice is an important decision especially in Japan because the affordability problem is still serious. The traditional model of tenure choice is one in which the own or rent decision is a function of the relative user costs of housing services obtained by owning versus renting and of permanent income, along with life cycle traits that reflect utility-based preferences for owner occupancy.

In Japan, the Japanese Tenant Protection Law was recently revised in March, 2000. This revision of the law introduced a fixed-term tenant contract system[1]. This new system was introduced to address some glaring problems affecting the rental market in Japan. Japanese rental housing is notorious for being cramped. Iwata (2002) points out that one of the reasons for this problem is the rent control system promoted by the Japanese Tenant Protection Law (JTPL)[2]. It is widely recognized that landlords have been reluctant to provide or adequately maintain rental properties because of legal

[1] A similar contract system was introduced to the land market in 1992 when the Land and Housing Lease law was enacted permitting owned houses with a fixed term lease for the land. Seko (2003) analyzed housing tenure choice decisions among privately owned houses, owned houses with general leased land, owned houses with fixed leased land and rental houses based on Japanese micro-data.

[2] Also see a similar related theoretical study by Seshimo (2003).

protections for tenants that restrict landlords' control over their property.

Before this revision of the JTPL, Japanese houses were largely classified into either owned house or rental house. This revision introduces a third choice into the Japanese housing market: rental house with a fixed rental term. This revision of the JTPL is expected to encourage an increase in the supply of good quality, large-size rental houses. Since the change of the law, this new type of contract for rental houses seems to have been increasing and gaining more popularity, as shown below in Table 1. Since 2002, over 20% of renters selected rental houses with a fixed rental term. The purpose of this paper is to highlight the difference between the two types of rental houses, analyze determinants of the choice among the three types of tenure - owned houses, general rental houses and rental houses with a fixed rental term, and examine the welfare implications of this revision of the JTPL.

The present study has the following three features. First, tenure choices between the three tenure categories - owned house, general rental house, and rental house with fixed rental term - and the welfare implications of the introduction of the third option are analyzed using Japanese micro-data.

Some previous studies about tenure choice in Japan examine the choice between

owned house and rental house (Horioka, 1988). The weakness of this traditional model is that it compares only two modes of tenure and ignores various important other features of the housing market. Bőrsch-Supan, Heiss and Seko (2001) further divide each of the two categories into two sub-categories: single family type and large family type. The present study is the first econometric study estimating the model including the rental house with fixed rental term by considering possible sample selection bias and calculating the compensating variation of the introduction of this tenure in Japan.

Second, the difference between general rental houses and rental houses with fixed rental term is reflected in the length of the contract term and the resulting rent level. The length of the contract term of the rental houses with fixed rental term is finite, while that of the general rental housing is open-ended. Tenants who choose the rental house with a fixed rental term must make a contract concerning the rent and the rental term with the landlord, and the tenant cannot continue to live in the rental housing beyond the expiration of the contract without reaching agreement with the landlord about extending and revising the contract. In contrast, for general rental housing the tenant can live in the rental house at the same rent on an open-ended basis. Price variables reflecting the length of the contract term are estimated by hedonic regression. The price variable constructed

in this way has the anticipated sign and significant coefficient in the estimated tenure choice model. This result implies the importance of housing characteristics in the three Japanese housing tenure choice options.

Third, this study draws on the Keio Household Panel Survey (hereafter denoted as KHPS). The KHPS has much information about household and housing characteristics. The KHPS enables us to analyze tenure choice among three types of tenure, because it has separate detailed information concerning the household and housing characteristics about both types of rental houses and owned houses.

The paper is organized as follows: In section 2, the data set and some descriptive statistics are explained. In section 3, the tenure choice econometric model is derived. In section 4, estimation results are discussed. In section 5, welfare implications of the revision of the JTPL and some other changes are shown. Section 6 concludes the paper.

2. Data and Hypothesis

2.1 Data Set

In this section, we introduce our data for Japanese households and show some descriptive statistics for the three tenure choices. The data is drawn from the KHPS. This

survey was started in January, 2004 by Keio University, and the second wave was conducted in January, 2005. Four thousand questionnaires were selected by a stratified two-stage random sampling. The major advantage of using the KHPS for our analysis is that we can obtain rich information about these three housing tenure choices concerning not only household characteristics such as income, household size and type, but also housing characteristics. The KHPS is especially useful for our purposes because it has separate rich information concerning both types of rental houses.

By using the first wave and second wave of the KHPS, we gather information about the house and the households when they moved into the present house such as tenure choice status, floor space, age of the house, number of rooms, household head's age, income, number of the family members, etc.

In Table 1, the number of households that moved to the present house between March, 2000 to January, 2005 were tabulated by tenure choice status. Over half of the households owned the house they lived in. Rental houses were classified into two categories, namely general rental house and rental house with fixed rental term. The number of households selecting general rental houses decreased gradually every year. In contrast, the number of rental houses with fixed term contracts has steadily increased.

The main purpose of this paper is to explain households' tenure choice behavior regarding those three tenures.

< Table 1 around here >

In order to explain this behavior, several explanatory variables are used. Definitions of these variables are described in Table 2 and some descriptive statistics are summarized in Table 3. These variables are largely classified into two categories: Housing characteristics and Household characteristics.

< Table 2 around here >

< Table3 around here >

2.2 Descriptive Statistics of Housing Characteristics

Descriptive statistics of some housing characteristic variables are summarized in the upper part of Table 3.

From Table 3, the average real house price (HLPB) is 33,496,000 yen. The average monthly rent of general rental house (RENT1) is 65,000 yen while the average monthly rent of a rental house with fixed rental term (RENT2) is 75,700 yen. Although at first glance, it seems that the average rent of a general rental house is lower than that of a

rental house with a fixed rental term, if we compare these two rents after controlling for the housing characteristics, the average rent of a general rental house is higher than that of a rental house with a fixed rental term in almost all periods (see section 2.4 below for details). This finding is generally consistent with previous studies such as, Ohtake and Yamaga (2001a, 2001b)[3] .

As for floor space (SPACE), the average of the owned house (112 m^2) is the biggest among the three tenure choices. The average floor space of the rental house with fixed rental term (51.4 m^2) is smaller than that of the general rental house (63.4 m^2) although general rental house has large variances, i.e. the difference within the sample is large. As for the average number of rooms (ROOMS), owned house has 5.1, general rental house is 3.3, and rental house with fixed rental term is 3.4. Although rental house with fixed rental term was introduced to supply large houses for family use, it seems that this initial policy purpose has not been satisfied.

The average age of the two types of rental houses is the same at 15.9 years. In contrast, the average age of owned houses is relatively young: 5.7 years. This seems to imply that

[3] The data set is quite different from their dataset. Our data set is more general than theirs, because their data is limited to only the Tokyo Metropolis and only new contract-basis asking rents. Our data set covers all Japan and includes not only newly contracted rents, but also the low rents for non-contract basis rentals. In addition our rents are the market rents which were actually contracted between landlords and tenants.

almost all of the supply of rental houses with fixed rental term came from the conversion of existing general rental house contracts instead of new construction.

In the tenure choice model discussed below, the fitted value of these prices using hedonic price models are used in the tenure choice model to represent these housing characteristic variables. Hedonic price models are specified as follows:

$$\mathrm{HLPB} = f(\mathrm{SPACE}, \mathrm{HAGE}, \cdots) \tag{1}$$

$$\mathrm{RENT1} = g(\mathrm{SPACE}, \mathrm{HAGE}, \cdots) \tag{2}$$

$$\mathrm{RENT2} = h(\mathrm{SPACE}, \mathrm{HAGE}, \cdots, \mathrm{CMONTH}, \cdots) \tag{3}$$

Equation (1) specifies the model of owned house price. Equation (2) is the model of general rental house rent. Equation (3) models rental house with fixed rental terms rent. The last model has the contract term variable CMONTH, which is not included in the other equations. We captured the difference between the two types of rental houses by the length of the contract term. The general rental house has in principle an open-ended contract period because the tenant residing in this type of rental house has the right to choose between renewing the contract without increasing the rent or ceasing the contract. On the other hand, the tenant residing in the rental house with fixed rental term does not have the right to renew the contract when the initial contract period expires. (For example, see Sotodate, 1997). We examine this issue in the hedonic regressions.

From the estimated results of these hedonic models, three types of fitted values are calculated for the whole sample. The fitted value of owned house price is HLPBHAT. These values are calculated not only from the owned house sample, but also from the rental house sample. For the rental sample, the fitted value of the owned house price represents the hypothesized house price if the household bought the rental house. In this way, the fitted values of general rental house rent and that of the rental house with fixed rental term rent are calculated, and these are denoted as RENT1HAT and RENT2HAT.

When we calculate RENT2HAT, we need to use the information about the term of the contract, CMONTH. This variable, however, does not exist in the owned house and the general rental house because the contract length is open-ended for these two choices. Therefore, for these two tenure type samples, we use the time since the household moved into the present house before January 2005, HMONTH as the proxy of the unobservable CMONTH. The fitted value of rental house with fixed rental term rent would represent the hypothesized rent if the household has rented the present house.

Dividing RENT1HAT and RENT2HAT by HLPBHAT, relative prices are derived. RELAP1 is the relative price between general rental house and owned house price, and RELAP2 is the relative price between rental house with fixed rental term and owned

house price. The relative price of owned house becomes 1. These relative prices are used to estimate the tenure choice model.

2.3 Descriptive Statistics of Household Characteristics

Descriptive statistics of some household characteristic variables are summarized in the lower part of Table 3.

Permanent income when the household moved into the present house is estimated by the Goodman and Kawai (1982) method, that is to say, regressing household income on various household head's characteristics. These variables are described in Table 9. Estimated results are tabulated in Table 10. Fitted values from this regression IMCOMPHAT are used as the estimates of permanent income. These values are also calculated for the households whose real actual income is missing.

The average age of the household head (hereafter denoted as h.h.) living in the owned house is the highest at 37.6 years old. The next highest is for rental house with fixed rental term at 36.3 years old. The lowest average age of household head is for general rental house at 33.7 years old. A histogram of the three tenure choices by h.h.'s age is depicted in Figure 1. Households with h.h. in their 20s seem to select rental house. Most

households with h.h. in their late 30s select owned house[4].

< Figure 1 around here>

Figure 2 shows the histogram of three tenure types by planned length of time until the household purchases an owned house. It is evident that rental house with fixed rental term is selected by households which have a plan to buy a house in less than 1 year. Households which have a longer term plan seem to select general rental house, because shorter term rental contracts don't match their housing purchase schedule.

< Figure 2 around here >

2.4 Hypothesis about Two Rental Houses

In this paper, the difference between general rental houses and rental houses with fixed rental term is reflected in the length of the contract term and the resulting rent level. As mentioned before, the length of the contract term of the rental houses with fixed rental term is finite, while that of the general rental housing is open-ended. Because of this difference between the two types of rental houses, in principle, rents for general rental houses are expected to be higher than those for the rental houses with a fixed rental term since the general rental houses have the additional value of an open-ended lease.

[4] Although the ownership rate decreases with age after the 40s, it may be because the KHPS consists of a sample of those between 20 to 69 years of age as of January, 2004, and also our sample consists

This expectation was checked by using the estimation results of the hedonic regression. For example, we will consider the following hypothetical case of a household that wanted to rent an apartment in the Kanto area in 2004. They would have searched for a house with 60 m^2 space, with 3 rooms that had been built 10 years ago, and planned to live there for two years for business reasons. By using the estimates of hedonic regression presented in Table 4, the rent per month of the general rental house was forecast as 84,885 yen, and that of the rental house with a fixed rental term was forecast as 70,147 yen. Figure 3 presents the two rent levels for this hypothetical case. The rent of the rental house with fixed rental term exceeds the rent of the general rental house after 102 months (8.5 years).

< Figure 3 around here >

3. Model Specification

3.1 Conditional Logit Model

In order to explain the household's behavior, we specified the conditional logit model with three choices. Tenure choice mode among three categories has also been discussed in Brownstone and Englund (1991)[5]. They analyze tenure choices among

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of the households who moved into the present house after March, 2000.

[5] Cho (1997) has analyzed four tenure choices.

owned house, rental house, and owned apartments (co-op shares). We derive the conditional logit model in this section.

We assume that each household, faced with the decision of optimal housing choice, examines all the alternatives available to it and decides on the best one. That is, the household chooses a housing alternative such that the level of utility derived from the choice is maximized subject to the budget constraint. Housing must be either owned houses, (j=0), general rented houses, (j=1), or rented houses with fixed rental term (j=2). The utility function of the household i ($i=1,\ldots,N$) choosing alternative j ($j=0,1,2$) is specified as follows:

$$U_{ij} = V_{ij}(H_{ij}, X_i : S_i) + \varepsilon_{ij} \tag{4}$$

where U_{ij} is the utility that the household i obtains by consuming housing alternative j, H_{ij} is the quantity of housing services which housing alternative j produces, X_i is the vector of other commodities household i consumes, S_i is the vector of characteristics that describe the household i, and ε_{ij} is the probabilistic error term.

The household i maximizes the utility function (4) subject to the budget constraint:

$$Y_i = pX_i + r_j H_{ij} \tag{5}$$

where, Y_i is real income of the household i, p is the price vector of X_i, r_j is price of the housing services alternative j produces with the restriction that it must choose only

one type of housing, i.e.

$$H_{i0} \cdot H_{i1} = H_{i1} \cdot H_{i2} = H_{i0} \cdot H_{i2} = 0. \quad (5')$$

The indirect utility function of the household *i* is derived from the above maximization problem, and is specified as:

$$U_{ij}^{*} = \beta' Z_{ij} + \delta_j' S_i + \varepsilon_{ij} \quad (6)$$

where Z_{ij} is the vector called attributes of the choices which varies across the household *i* and across alternative *j* as well. β and δ_j are the parameter vectors to be estimated, and the parameter vector related to the owned house δ_0 is normalized to be zero.

From the theoretical framework, Z_{ij} is considered as the function of H_{ij}^{*}, which is the quantity of housing services housing alternative *j* actually produces, r_j, which is the price of the housing services alternative *j* produces, and p, the price vector of X_i. Therefore, Z_{ij} is specified as $Z_{ij} = Z_{ij}(H_{ij}^{*}, r_j, p)$. Further, we assume that Z_{ij} is represented by hedonic price models, equation (1), (2), and (3), and fitted values of those hedonic models are used as proxies.

U_{ij}^{*} is assumed to be the maximized utility the household *i* obtained by choosing alternative *j*. Then the probability that the household *i* chooses alternative *j* can be expressed as:

$$P_i(j) = \Pr ob(U_{ij}^* > U_{ik}^*) \quad for \;\; j \neq k. \tag{7}$$

We assume that ε_{ij} follows independently and identically distributed with the extreme value distribution. The following model is called conditional logit model by McFadden (1978) and is derived as follows:

$$P_i(j) = \frac{\exp(\beta' Z_{ij} + \delta_j' S_i)}{\sum_{j=0}^{3} \exp(\beta' Z_{ij} + \delta_j' S_i)}. \tag{8}$$

3.2 Estimation Procedure

We have corrected sample selection bias stemming from hedonic price functions (1), (2) and (3) for each tenure alternative *j* by using the generalized version of the Heckman (1979) two-step procedure for multivariate choice models. Because HLPB, RENT1 and RENT2 are observed if and only if the *j*th housing tenure is chosen, estimating each hedonic price equation with the data observed in each tenure category by OLS will, in general, give biased estimates because the households that choose a particular tenure are likely to have characteristics which cause them to favor that housing tenure[6].

We use the method proposed by Lee (1983) to overcome the sample selection bias in hedonic regressions, and then estimate the conditional logit model[7]. On the first step the

[6] Gu and Colwell(1997) indicates the possibility that rent levels are affected by borrower's characteristics.

[7] See Dolton et al. (1989) for the application for labor economics.

reduced form of the housing tenure choice equation is estimated using the multinomial logit model. Here the reduced form of the housing tenure choice equation is obtained from (8) by substituting the hedonic price models (1), (2) and (3) into (8), i.e. into Z_{ij} term. On the second step, by using the predicted probability selecting the jth housing tenure, $P_i(j)$, the sample selecting terms $\lambda_{ij} = -\phi(\Phi^{-1}(P_i(j)))/P_i(j)$ are calculated, where ϕ and Φ are normal p.d.f. and c.d.f. respectively. Hedonic regressions are re-estimated by including λ_{ij}, and estimated standard errors are corrected by the Lee et al. (1980) method. This procedure gives consistent estimates of the coefficients. On the third stage of the estimation procedure, the structural conditional logit model is estimated as follows. First, the fitted prices of the hedonic models are transformed into relative price terms. And then these relative prices are substituted into (8) and finally the structural conditional logit model is estimated.

4. Estimation Results

Results of the hedonic price regressions augmented by the sample selecting terms are tabulated in Table 4. The natural log transform is applied to the dependent variables and SPACE. As a whole, the models are fitted well, though the fit of the model of rent of

general rental house is rather worse. Especially for the rental house with fixed rental term rent model, the coefficient of the contract term (CMONTH) has the anticipated positive sign, and becomes significant at the 10% level, that is, there is a tendency that the longer the contract term becomes, the higher the rent is.

The estimation result of the structural conditional logit model by substituting the fitted values of hedonic regressions is tabulated in Table 5. It is well known that the conditional logit model has the property of independence of irrelevant alternatives (IIA). This hypothesis of IIA is tested by the method proposed by Hausman and McFadden (1984). The test statistic is calculated by comparing the parameters of conditional logit model with the parameters of the model estimated by excluding observations of selecting a rental house with fixed rental term. The test statistics in Table 6 is 0.138, which is too small to reject the hypothesis. This implies that the rental house with fixed rental term is considered to be the independent third tenure by households.

In Table 5, as for the parameter estimates of β, the coefficient of the relative price (RELAP) becomes negative and significant as expected. Price elasticities on selecting probabilities are tabulated in Table 7. All of these estimates have the expected signs; own elasticities are negative, and cross elasticities are positive. They are all significant at the

1% level. Those results suggest that those three tenures are substitutes for each other.

Next we go to the estimates of δ_j. Estimates of the general rental house and the rental house with fixed rental term are presented in Table 5. Elasticities of probabilities of selecting housing tenure are tabulated in Table 7. Estimates of both types of rental house show similar results except for two points. The first point is the coefficient of permanent income (INCOMEPHAT). Although both of these values have the expected negative signs, the coefficient of the general rental house is significant at 1%, while the same value for the rental house with a fixed rental term is significant at the 15% level. For the income elasticities of selecting probabilities of housing tenure, elasticity of selecting general rental house is -0.976, and that of selecting rental house with fixed rental term is -0.177. From these results, we can see that the higher income households do not tend to select rental house, while the households who select rental house with fixed rental term think of other factors like a plan of length to live in the same house as more important than income when they determine their housing tenure.

The second point is that the length of period the household has lived in the same house until January, 2005 (HMONTH). HMONTH has been included as the proxy variable of the predicted value of the length of the period the household plans to live in the house

when they moved in. In parameters of the rental house with fixed rental term, the coefficient of this is negative and significant at the 5% level although the same value of general rental house is not significant at all. From Table 7, we see that a 1% increase of length of period living in the same house reduces the probability of selecting rental house with fixed rental term by 0.871%. On the other hand, a 1% increase of length of period living in the same house increases the probability of selecting a general rental house by 0.165%. This result suggests that the households that plan to stay shorter periods select rental house with fixed rental term. This result is also consistent with Figure 2 where we present a histogram of three tenure types by planned length of time until the household purchases an owned house. From a supply side perspective, this implies that after the revision of the JTPL the owners of the rental house with a fixed rental term gain more control over their property, for instance, for remodeling, or reconstruction of the building.

< Table5 around here >

< Table6 around here >

<Table7 around here >

5. Simulation of Compensating Variations

5.1 Welfare implications of the revision of the JTPL

The revision of the JTPL is expected to encourage an increase in the supply of good quality, large-size rental houses. Moreover, since the change of the law, the new type of contract for rental houses seems to have been increasing and gaining more popularity.

In the following section, we analyze the welfare implications of the revision of the JTPL using the most widely used welfare measure, the compensating variation.(See, Train,(1998, 2003) for the compensating variation for the logit model.) We use the coefficient of relative price as the parameter of the cost variable.

We calculate the change in consumer surplus that arises from eliminating the rented houses with fixed rental term from households' choice sets. The first part of Table 8 gives the compensating variation associated with the elimination of the rental house with fixed rental term. The means, which range from -1,748,200 yen to -2,260,000 yen, represent estimates of the amount that households must be compensated for the lower utility that they obtain from choosing another housing tenure other than rental house with fixed rental term . That is to say, taking the whole sample, eliminating the rental house with fixed rental term option decreases the compensating variation by 1,969,847 yen which is 31.8 % of average household income. For the household selecting rental house with

fixed rental term the compensating variation decreases by 2,260,000 yen or 39.6% of average household income.

5.2 Welfare Implications

In this section, we analyze the welfare implications of a change in the price of each housing alternative.

We calculate the compensating variation associated with the 10% increase in the price of each housing alternative. The results are given in the second to fourth parts of Table 8. An increase in the price of the selected housing tenure theoretically implies that the households are on average worse off. From Table 8, overall, an increase of the price of any housing tenure makes the households worse off. However, the amount of decrease is larger in the case of selected housing tenure, and smaller in the case of alternative housing tenure.

The estimated compensating variation is highest for the 10% increase in the price of owner occupied houses among the three cases. As a result of the 10% increase of the rent of both types of rental houses in case 3 and 4, the amount of decrease of compensating variation of the rental house with fixed rental term is larger than that of the general rental house.

< Table 8 around here>

6. Conclusion

In this paper, a conditional logit model was estimated to analyze the household behavior involving housing choices among three tenures - owned house, general rental house and rental house with fixed rental term after the revision of the JTPL Japanese Tenant Protection Law in 2000. The effectiveness of this revision was examined calculating estimated compensating variation. From the estimation results, we find that: (1) The three tenure types are substitutes for each other, (2) Both general rental house and rental house with fixed rental term respond to the increase of permanent income, and the former response is larger than the latter. (3) The household that rents housing for a shorter period tends to select the rental house with a fixed rental term. (4) Households with a smaller number of family members, especially single-member households, tend to select both types of rental housing. In summary, from the demand side, households with fewer family members tend to select both types of rental housing. Households which have more income and can explicitly forecast their short term rental needs select the rental housing with fixed rental term. As for the impact and effectiveness of this revision, from the calculation of compensating variation, it was shown that rental house with fixed

rental term improves the welfare of all households. From the supply side, our findings indicate that the owners of the rental house are able to supply more rental houses with fixed rental term to meet household needs.

Housing demand behavior of Japanese households is quite heterogeneous according to price, income, demographic factors and contract form in the rental market. Our study indicates that deregulation of the housing market has worked to meet this diversity of household needs. Providing greater choice is important to enhance welfare in a society where tastes and needs are diversifying.

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Appendix

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Table 1: Number of Households Moved to the Present House classified by Three Tenure Types between March, 2000 to January, 2005

	2000*	2001	2002	2003	2004**	Total
Owned house						
a. single detached house (owned land)	60	51	58	65	58	292
b. condominium (owned land)	11	6	7	11	16	51
c. a or b (general leased land)				2	2	4
d. a or b (fixed leased land)				1	2	3
sub total	71	57	65	79	78	350
	67%	51%	52%	53%	55%	55%
General rented house						
e. private rented house	20	29	21	32	26	128
f. public rental house	6	8	8	7	31	
sub total	26	37	29	39	27	158
	25%	33%	23%	26%	19%	25%
Rented house with fixed rental term						
g. private rented house	8	18	27	30	33	116
h. public rented house	1	3	2	2	10	
sub total	9	18	30	32	36	125
	8%	16%	24%	21%	26%	20%
Total	106	112	124	150	141	633
	100%	100%	100%	100%	100%	100%

Note: *: later March, 2000, **: including January, 2005.
Before eliminating the missing observations

Table 2 : Variable Definitions

	definition
TENURE	0: Owned house, 1: General rental house, 2: rental house with fixed rental term
Housing characteristics	
HLPB	Real structure and land price in 10 thousand yen at 2000 price, deflator:CPI
RENT1	Real rent of general rented house in 10 thousand yen at 2000 price, deflator:CPI
RENT2	Real rent of rented house with fixed rental term in 10 thousand yen at 2000 price, deflator:CPI
RELAP1	Fitted value of rent1/ Fitted value of hlpb
RELAP2	Fitted value of rent2 / Fitted value of hlpb
HAGE	Age of house in 2004
SPACE	house floor space (m2)
ROOMS1-ROOMS6-9	1: If the number of rooms of the present house equal to #
(Level of repair)	
REPAIR1	1: no repair
REPAIR2	1: if level of repair is medium
REPAIR3	1: if level of repair is great
(House structure)	
HTYPE1	1: if type of the house is single house
HTYPE2	1: if type of the house is attached house (row house)
HTYPE3	1: if type of the house is condominium
HTYPE4	1: if type of the house is apartment
HTYPE5	1: if other type house
Household characteristics	
INCOMPHAT	Permanent income
HHAGE	age of household head when the family moved to present house
FMEMBER	number of family members when moved to present house
HMONTH	length of period lived in present house
CMONTH	length of contract term of rental house with fixed rental terms (unit: month)
SINGLE	household type 1:single-member household
(regions)	
RG1	1: Hokkaido area
RG2	1: Tohoku area
RG3	1: Kanto area
RG4	1: Chubu area
RG5	1:Kinki area
RG6	1: Chugoku area
RG7	1: Shikoku area
RG8	1: Kyushu area
(time dummies)	
YRST2000-YRST2005	1: if the household moved to the present house at given year between 2000 to 2005.

Table 3 : Descriptive Statistics

	Owned house		General rental house		Rental house with fixed rental term	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
(Housing characteristics)						
HLPB	3349.6	1601.3				
RENT1			65.0	32.2		
RENT2					75.7	42.7
SPACE	112.0	56.5	63.4	104.3	51.4	32.8
HAGE	5.7	6.3	15.9	10.9	15.9	11.2
ROOMS	5.1	1.3	3.3	1.3	3.4	1.6
ROOMS1	0.007	0.085	0.068	0.254	0.130	0.339
ROOMS2	0.007	0.085	0.148	0.357	0.130	0.339
ROOMS3	0.015	0.120	0.398	0.492	0.315	0.469
ROOMS4	0.343	0.476	0.295	0.459	0.241	0.432
ROOMS5	0.343	0.476	0.045	0.209	0.130	0.339
ROOMS6_9	0.285	0.453	0.045	0.209	0.056	0.231
REPAIR1	0.847	0.362	0.875	0.333	0.870	0.339
REPAIR2	0.124	0.331	0.080	0.272	0.093	0.293
REPAIR3	0.029	0.169	0.045	0.209	0.037	0.191
HTYPE1	0.788	0.410	0.182	0.388	0.241	0.432
HTYPE2	0.000	0.000	0.068	0.254	0.074	0.264
HTYPE3	0.212	0.410	0.511	0.503	0.444	0.502
HTYPE4	0.000	0.000	0.216	0.414	0.241	0.432
(Household characteristics)						
INCOMPHAT	626.9	200.1	491.6	176.2	570.5	246.6
HHAGE	37.6	9.4	33.7	9.3	36.3	11.8
FTYPE6	0.007	0.085	0.216	0.414	0.241	0.432
FMEMBER	3.7	1.2	2.5	1.2	2.6	1.4
HMONTH	42.8	17.5	42.8	17.0	37.0	15.1
CMONTH	---		---		45.8	16.4
RG1	0.058	0.235	0.080	0.272	0.093	0.293
RG2	0.022	0.147	0.034	0.183	0.000	0.000
RG3	0.372	0.485	0.386	0.490	0.574	0.499
RG4	0.102	0.304	0.091	0.289	0.130	0.339
RG5	0.307	0.463	0.182	0.388	0.074	0.264
RG6	0.036	0.188	0.045	0.209	0.019	0.136
RG7	0.036	0.188	0.034	0.183	0.037	0.191
RG8	0.066	0.249	0.148	0.357	0.074	0.264
YRST2000	0.204	0.405	0.182	0.388	0.056	0.231
YRST2001	0.182	0.388	0.227	0.421	0.167	0.376
YRST2002	0.190	0.394	0.205	0.406	0.296	0.461
YRST2003	0.219	0.415	0.239	0.429	0.259	0.442
YRST2004	0.197	0.399	0.148	0.357	0.204	0.407
YRST2005	0.007	0.085	0.000	0.000	0.019	0.136
N	137		88		54	

Note: After eliminating missing observations

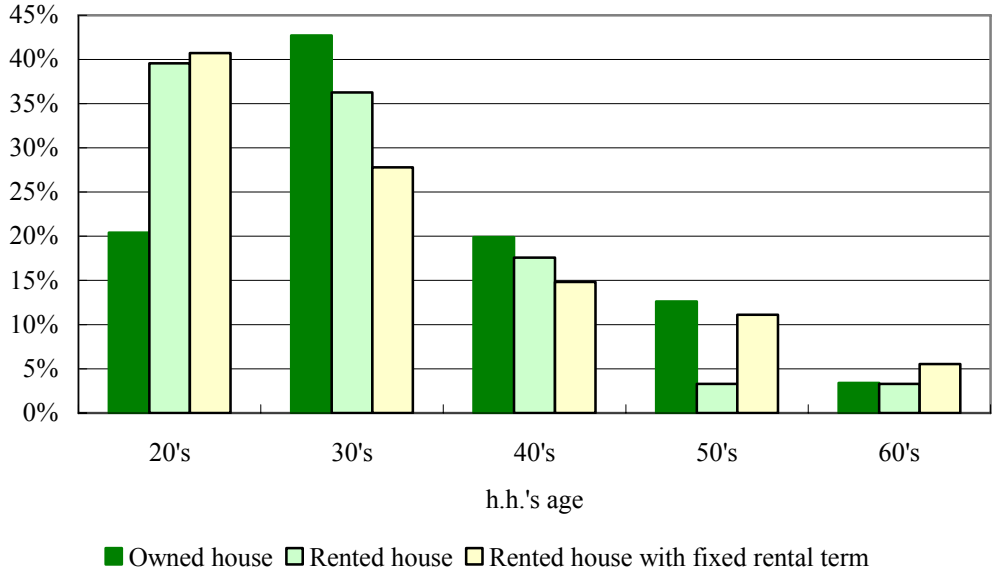

Figure 1 : Histogram of Three Tenure Types by h.h.'s Age
Note: Before eliminating missing observations

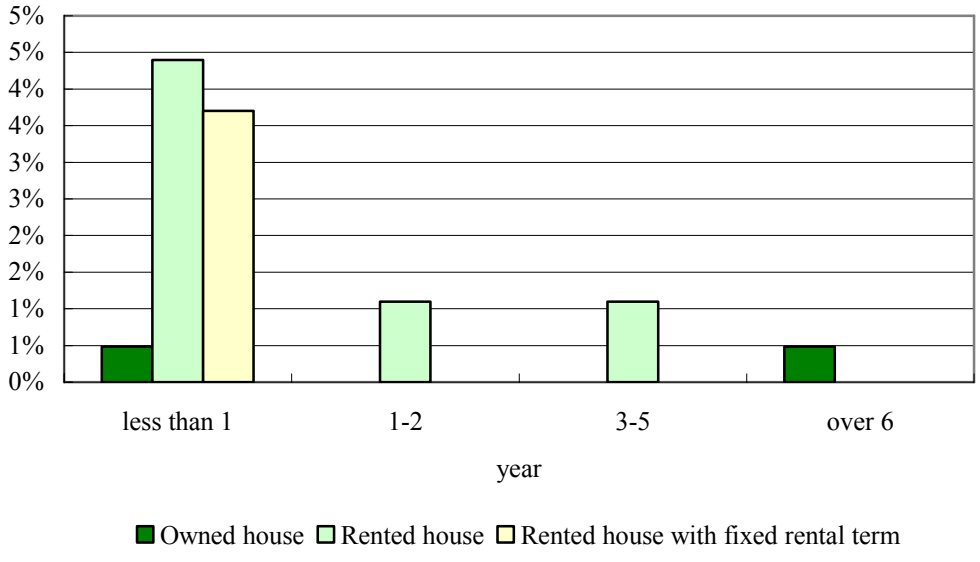

Figure 2: Histogram of Three Tenure Types by Time Length of Plan to own House
Note: Before eliminating missing observations

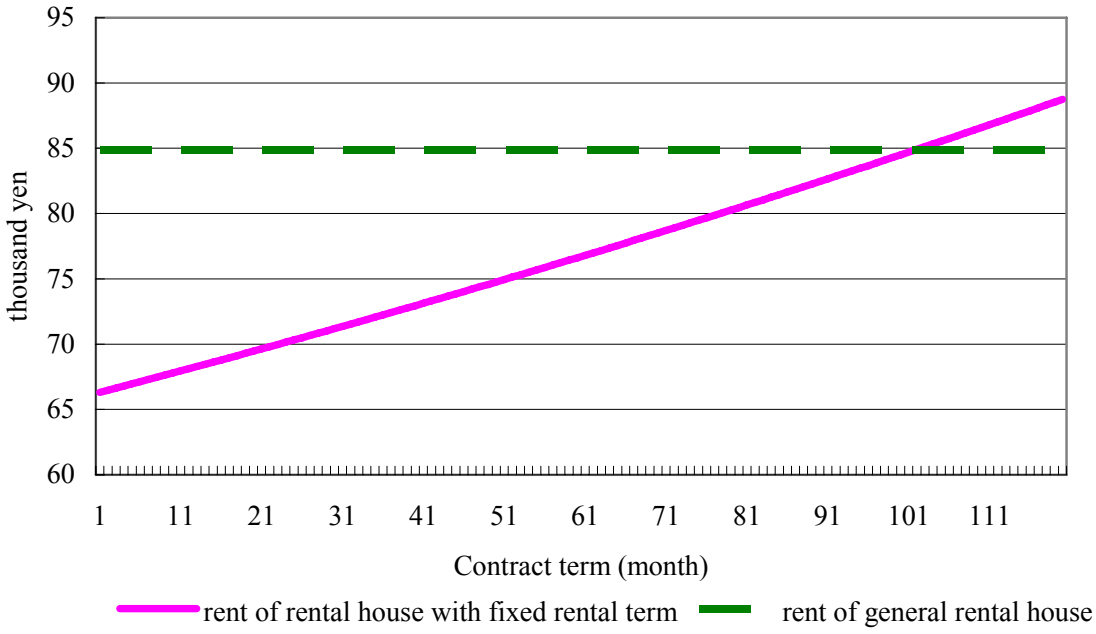

Figure 3: Comparison of Rents of Two Types of Rented Houses: Hypothetical Case

Table 4 : Estimation Results of the Hedonic Regression

	Owned house			General rental house			Rental house with fixed rental term		
Dependent var.	ln(HLPB)			ln(RENT1)			ln(RENT2)		
Variables	Coef.	z		Coef.	z		Coef	z	
ln(SPACE)	0.440	5.18	***	-0.052	-0.49		0.332	8.30	***
HAGE	-0.031	-3.65	***	-0.020	-3.72	***	-0.022	-11.40	***
ROOMS1	-1.860	-4.39	***	-0.943	-4.44	***	-0.019	-0.34	
ROOMS2	-1.658	-4.52	***	-0.193	-1.25		0.215	4.22	***
ROOMS3(reference)									
ROOMS4	-0.585	-2.00	**	-0.412	-2.89	***	0.258	4.96	***
ROOMS5	-0.457	-1.52		-0.614	-2.18	**	0.022	0.33	
ROOMS6_9	-0.363	-5.13	***	-0.168	-0.52		0.671	7.60	***
HTYPE1(reference)									
HTYPE2		---		0.052	0.22		-0.558	-11.57	***
HTYPE3	-0.078	-0.69		-0.003	-0.02		-0.023	-0.51	
HTYPE4		---		-0.319	-1.57		-0.176	-3.39	***
REPAIR1(reference)									
REPAIR2	-0.053	-0.77		-0.423	-2.05	**	0.020	0.34	
REPAIR3	0.099	0.68		-0.540	-2.01	**	-0.280	-3.48	***
RG1	-0.677	-5.07	***	-0.931	-4.88	***	-0.163	-2.84	***
RG2	-0.471	-4.48	***	-0.255	-0.77			---	
RG3(reference)									
RG4	-0.499	-5.88	***	-0.209	-1.15		-0.517	-10.78	***
RG5	-0.213	-2.72	***	-0.164	-1.03		-0.373	-5.12	***
RG6	-0.422	-4.81	***	-0.474	-1.99	**	-0.570	-4.67	***
RG7	-0.394	-1.35		-0.525	-1.84	*	-0.466	-6.02	***
RG8	-0.432	-0.86		-0.383	-2.21	**	-0.320	-5.55	***
YRST2000(reference)									
YRST2001	-0.148	-1.91	*	0.199	1.26		0.048	0.62	
YRST2002	-0.234	-2.91	***	-0.240	-1.45		0.061	0.74	
YRST2003	-0.261	-3.51	***	0.309	1.95	*	0.189	2.12	**
YRST2004	-0.223	-2.70	***	0.329	1.74	*	0.123	1.17	
YRST2005	-0.616	-2.12	**		---		-0.068	-0.50	
CMONTH		---			---		0.002	1.66	*
Constant	7.054	16.08	***	4.841	9.18	***	3.102	14.68	***
λ	-0.018	-0.15		-0.240	-1.32		-0.138	-2.67	***
N		137			88			54	
Adjusted R-squared		0.57			0.47			0.82	
s		0.30			0.51			0.18	

Note: Standard errors were corrected by Lee et al. (1980) method.
Significance level: ***:1%, **: 5%, *: 10%

Table 5 : Estimation Results of the Conditional Logit Model

Variables	Coef.	S.E.	z		Coef.	S.E.	z	
RELAP	-2.631	0.890	-2.96	***				
	(General rented house)				(Rental house with fixed rental term)			
INCOMPHAT	-0.003	0.001	-3.04	***	-0.001	0.001	-1.47	+
HHAGE	0.006	0.019	0.33		0.012	0.021	0.58	
HMONTH	-0.002	0.009	-0.20		-0.027	0.011	-2.51	**
FMEMBER	-0.503	0.152	-3.31	***	-0.515	0.170	-3.03	***
SINGLE	2.319	1.094	2.12	**	2.479	1.118	2.22	**
RG1	0.278	0.637	0.44		0.121	0.677	0.18	
RG2	0.892	0.918	0.97			---		
RG3(reference)								
RG4	-0.073	0.536	-0.14		0.034	0.553	0.06	
RG5	-0.746	0.410	-1.82	*	-2.067	0.605	-3.42	***
RG6	0.211	0.798	0.26		-1.125	1.182	-0.95	
RG7	-0.170	0.824	-0.21		-0.661	0.926	-0.71	
RG8	0.633	0.549	1.15		-0.371	0.696	-0.53	
N			279					
Log likelihood			-239.76					

Note: Significance level: ***:1%, **: 5%, *: 10%, +: 15%
Standard Errors computed from analytic second derivatives (Newton)

Table 6 : Test of Independence of Irrelevant Alternatives

Hausuman statistics	0.138
chi square critical value (d.f.=13, 5%)	22.4

Note: This statistics is calculated by excluding the household lives in the rental house with fixed rental term

Table 7: Elasticities on Probabilities selecting Housing Tenure

Variables	Owned house	General rental house	Rental house with fixed rental term
HLPB	-1.331 ***	1.301 ***	1.301 ***
RENT1	0.028 ***	-0.062 ***	0.028 ***
RENT2	0.027 ***	0.027 ***	-0.109 ***
INCOMPHAT	0.681 ***	-0.976 ***	-0.177
HHAGE	-0.153	0.070	0.274
HMONTH	0.243	0.165	-0.871 ***
FMEMBER	0.801 ***	-0.768 **	-0.807 **
SINGLE	-0.142 ***	0.132 **	0.151 **
RG1	-0.008	0.012	0.001
RG2	-0.006	0.013	-0.006
RG3		(reference)	
RG4	0.002	-0.006	0.005
RG5	0.141 ***	-0.024	-0.318 ***
RG6	0.006	0.013	-0.035
RG7	0.007	0.000	-0.017
RG8	-0.011	0.048 +	-0.046

Note: These values are evaluated at mean.
Significance level: ***:1%, **: 5%, *: 10%, +: 15%

Table 8 : Policy Scenarios and Mean Compensating Variation

(in 10 thousand yen)

Scenario	Mean	S.D.
1.Eliminate rental house with fixed rental term		
Whole sample	-196.98	203.17
Owner-occupied house	-199.78	177.24
General rental house	-174.82	169.55
Rental house with fixed rental term	-226.01	295.00
2. 10% increase in price of owner occupied house		
Whole sample	-128.81	106.03
Owner-occupied house	-196.60	102.25
General rental house	-64.15	56.66
Rental house with fixed rental term	-62.19	59.38
3. 10% increase in rent of general rental house		
Whole sample	-1.68	1.37
Owner-occupied house	-1.28	0.76
General rental house	-2.18	1.68
Rental house with fixed rental term	-1.89	1.70
4. 10% increase in rent of rental house with fixed rental term		
Whole sample	-1.85	1.65
Owner-occupied house	-1.90	1.67
General rental house	-1.66	1.61
Rental house with fixed rental term	-2.01	1.65

Table 9 : Variable Definitions used to Estimation of Permanent Income Model

variable name	definition
(h.h.'s education)	
ed1	1: if household head graduated junior high school
ed2	1: if household head graduated high school
ed3	1: if household head graduated from junior college or vocational college
ed4 (reference)	1: if household head graduated from university
ed5	1: if household head graduated from graduate school
ed6	1: if household head graduated from other school
ed7	1: if the household head is educated under old education system
(h.h.'s business)	
oc1	1: if household head is a farmer
oc2	1: if household head works in mining industry
oc3	1: if household head works as salesperson
oc4	1: if household head works in service industry
oc5	1: if household head holds managerial position
oc6 (reference)	1: if household head works as office worker
oc7	1: if household head works in transport industry
oc8	1: if household head works in product industry
oc9	1: if household head works as self employed
oc10	1: if household head works as professional worker
oc11	1: if household head works as guard
oc12	1: if household head works in other industry
(h.h.'s business industry)	
ind1	1: if household head is working in agriculture industry
ind2	1: if household head is working in fish, woods industry
ind3	1: if household head is working in mining industry
ind4	1: if household head is working in construction industry
ind5 (reference)	1: if household head is working in production industry
ind6	1: if household head is working in wholesale and retail industry
ind7	1: if household head is working in restaurant and hotel industry
ind8	1: if household head is working in financial and insurance industry
ind9	1: if household head is working in real estate industry
ind10	1: if household head is working in transportation industry
ind11	1: if household head is working in information industry
ind12	1: if household head is working in communication industry
ind13	1: if household head is working in electricity, gas and water supply industry
ind14	1: if household head is working in hospital
ind15	1: if household head is working in study industry
ind16	1: if household head is working in service industry
ind17	1: if household head is working as civil servant
ind18	1: if household head is working in other industry
(h.h.'s firm size)	
frmsz1	1: if household head works alone
frmsz2	1: if household head works with 2-4 workers
frmsz3	1: if household head works with 5-9 workers
frmsz4	1: if household head works with 10-29 workers
frmsz5	1: if household head works with 30-49 workers
frmsz6	1: if household head works with 50-99 workers
frmsz7	1: if household head works with 100-299 workers
frmsz8 (reference)	1: if household head works with 100-299 workers
frmsz9	1: if household head works with 500-999 workers
frmsz10	1: if household head works with over 1000 workers
frmsz11	1: if household head works in public sector corporations

Table 10: Estimation Results of Permanent Income Model

Dependent var.	ln(incomp)	
Independent var.	Coef.	z
hhage	0.019	4.57 ***
hhfemale	-0.486	-2.51 **
ed1	-0.055	-0.21
ed2	-0.016	-0.16
ed3	0.120	0.89
ed5	0.074	0.4
ed6	0.030	0.17
oc1	-1.117	-1.91 *
oc3	0.027	0.2
oc4	-0.433	-1.61 #
oc5	0.174	1.17
oc7	-0.046	-0.25
oc8	-0.189	-1.57 #
oc9	-0.028	-0.13
oc10	0.101	0.82
oc11	0.081	0.14
oc12	0.284	0.85
ind4	-0.055	-0.46
ind6	-0.235	-1.68 *
ind7	-0.258	-0.66
ind8	0.283	1.25
ind9	-1.498	-2.14 **
ind10	-0.066	-0.31
ind11	0.013	0.07
ind12	-0.089	-0.37
ind13	-0.070	-0.32
ind14	-0.421	-1.89 *
ind15	-0.436	-2.12 **
ind16	-0.050	-0.41
ind17	-0.202	-0.75
ind18	0.473	1.02
frmsz1	-0.304	-2.22 **
frmsz2	-0.090	-0.76
frmsz3	-0.073	-0.56
frmsz4	-0.067	-0.72
frmsz6	0.206	0.76
frmsz9	0.067	0.24
yrst2001	0.052	0.43
yrst2002	-0.009	-0.09
yrst2003	-0.001	-0.02
yrst2004	0.128	1.24
yrst2005	-0.043	-0.27
rg1	0.133	0.88
rg2	-0.040	-0.19
rg4	-0.013	-0.09
rg5	0.069	0.75
rg6	-0.070	-0.41
rg7	0.020	0.09
rg8	0.039	0.36
constant	5.754	25.68 ***
N	318	

Note: Income model is estimated by least absolute deviation method with standard error bootstrapped (100 replications).
Significance level: ***: 1%, **: 5%, *: 10%, #: 15%.