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Tenancy Contract Choice and Land Improvement Investment for Upland Farming

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Relationship-specific investment in land improvement (e.g. deep plowing and soil dressing) is necessary for upland farming. If farmers leasing farmland are in an environment where they are able to freely decide whether or not to invest in land improvement, no problem arises. However, if their intention to invest in land improvement is inhibited by some factors, the problem of inefficient farming due to underinvestment may arise. The problem of underinvestment is most likely to occur under off-the-record farming contracts (*yami kosaku*), which are a type of "incomplete contract" in the sense that the contract period is not predetermined. Because of incomplete contracts, farmers are unwilling to invest since they cannot predict if they will recoup their investment value while being open to eviction threats (i.e. holdup problem). Based on these points, this paper aims to analyze the empirical determinants on contract type (i.e. establishing right of use basis, or off-the-record contract basis) and the farmers' investment choice in land improvement, using original data from Atsumi-cho, Aichi Prefecture. The main findings are as follows. First, use-right contracts encourage farmers to invest in the leased land. It was indicated that the type of contract influences the incentive for land investment. Second, it was also found that the degree of trust (e.g. kinship and proximity) between the landowner and the farmer positively influences land investment. The third finding was that the degree of opportunity cost regarding the landowner's flexibility to engage in farming also influences contract choice. Landowners not likely to engage in agriculture were highly inclined to opt for use-right contracts. These findings call for the encouragement of use-right contracts by local governments, and a compensation scheme for "beneficial expenses" in order to provide farmers with incentives for land improvement.

Key words: tenancy contract choice, relationship-specific investment, incomplete contract, holdup problem, beneficial expense, trust, opportunistic behavior

1. Introduction

1) Discussion focus

Relationship-specific investment in land improvement is necessary for the improvement of agricultural productivity. It is particularly important for upland farming, which is, unlike rice paddy farming, highly susceptible to damage from continuous cropping, and constantly requires action to improve the soil such as composting, deep plowing and soil dressing. If farmers leasing farmland were in an environment where they were able to freely decide whether or not to invest in land improvement, no problem would arise. However, if their intention to invest in land improvement is inhibited by some factors, the problem of inefficient farming due to underinvestment may arise. The problem of underinvestment is most likely to occur under off-the-record farming contracts (*yami kosaku*),[1] where the contract period is not specified. An off-the-record farm-

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ing contract is a typical form of incomplete contract. Since it is incomplete, farmers are unable to predict in advance whether the landowners will behave opportunistically (e.g., asking for the return of the farmland immediately after the tenant farmer makes an investment in the land), and this makes farmers reluctant to invest in land improvement (i.e., holdup problem). Meanwhile, farmland leased under off-the-record contracts is not always subject to underinvestment. Mutual trust between lender landowners and tenant farmers may deter the landowners from opportunistic behavior. In short, in farmland leasing, the relationship between the landlord and the tenant, the form of leasing contract and the contract period are highly important.

Thus, this paper presents an econometric analysis of strategic behaviors by lender landowners and tenant farmers regarding choices for farmland lease contracts (establishing right of use basis, or off-the-record contract basis) and choices for land improvement investment, to clarify the determinant factors for the choices. Although underinvestment in land improvement is a classic phenomenon that has been constantly observed in land use transactions, no analyses of this phenomenon employing modeling or quantitative approaches have been conducted. I therefore believe that analyzing serious land-related institutional problems is a socially significant enterprise.

2) Target area of analysis

The target area of the analysis is Atsumi-cho (now Tahara City), Aichi Prefecture.[2] Atsumi-cho experienced a drastic change in its regional agriculture after the completion of Toyokawa Canal in 1968. Before the canal was completed, the area mainly produced wheat and potatoes. But after a full-scale water supply was started from the canal, major crops shifted to vegetables and flowers, taking advantage of the area's mild climate. As a result, Atsumi-cho has achieved remarkable growth as a prominent production center of cabbages and chrysanthemums (grown through the illumination method), boasting extremely high agricultural production income per farm household, with seven times higher than the national average in 2000.

Atsumi-cho was chosen as the target area for the analysis on farmland lease contracts and land improvement investment for the following two reasons:

First, Atsumi-cho has large upland farming areas, which is absolutely necessary for the purpose of this analysis. According to the *Census of Agriculture and Forestry* in 2000, rice paddies account for 13.9% of the total operated farmland area of Atsumi-cho while upland farm fields account for 85.5%. With such a small rice paddy area, Atsumi-cho is an appropriate place to be used for discussions on land lease contracts for upland farming.

Second, as explained below, it is assumed that the land lease market in Atsumi-cho structurally gives landowners strong bargaining power. When the landlord has strong bargaining power, the tenant has to accept the offer of an off-the-record contract from the landlord even though they prefer establishing land-use rights in order to eliminate instability of land lease. Since the landlord can easily find another tenant, the cost of opportunistic behavior is lower than when the tenant has stronger bargaining power. In short, when the landlord has strong bargaining power, "beneficial expenses" problems often arise with tenants unable to recover the costs they paid for land improvement investment and therefore, Atsumi-cho is suitable for this analysis.

3) Earlier studies

Regarding farmland lease contracts, especially the choice between cash rent and share crop contracts, many studies have been conducted both theoretically and empirically.[3] However, no studies have analyzed the issue of lease contract choices econometrically, focusing on the stability of farmland lease contracts (oral or written, short-term or long-term contracts) except the studies by Allen and Lueck[2], Bandiera[4], and Jacoby and Mansuri[11].[4]

Allen and Lueck[2] classified lease contracts according to two attributes: 1) oral or written, and 2) annual or multiyear, and based on the data of the American states of Nebraska, South Dakota and Louisiana, and the Canadian province of British Columbia for 1986 and 1992, empirically demonstrated that three determinant factors for choice of

contract are (1) transaction-specific assets, (2) reputation, and (3) common law. However, landlords' characteristics are not sufficiently considered in this study.[5)]

Bandiera[4] investigated the determinant factors for choice regarding (a) contract duration (long-term or short-term) and (b) contract type (cash rent or share crop) based on the data of Syracuse, Italy from 1870 to 1880. As a result of the analysis, Bandiera[4] discovered the determinant factors are (1) crop type, (2) tenant's attitude toward risk and (3) landlord's characteristics. Bandiera's study is unique in that it considers not only the tenant's but also the landlord's attributes, and in that the choices of contract period and type are simultaneously estimated using the Bivariate Probit Model.

Both Allen and Lueck[2] and Bandiera[4] presented the determinant factors for choosing contract period and contract type, but did not conduct quantitative analysis to clarify the circumstances under which tenants have an incentive to invest in land improvement.

On the other hand, Jacoby and Mansuri[11] investigated the choice of non-contractible investment (i.e. farmyard manure) and tenancy duration on the leased land, using detailed plot-level data from rural Pakistan during 2004-2005. The highlight of Jacoby and Mansuri[11] is that non-contractible investment is underprovided on the leased land even after controlling the endogenous problems, based on using (1) plots within the same household, to deal with tenant's unobservable characteristics and (2) the landowner's cultivating status, (3) the landowner's proximity to the plot to consider the plot condition on the leased land.

In Japan, studies on farmland lease contracts and land improvement investment have been conducted by Furue[7], Kajii[12], Shimamoto[21], Tashiro[25], Yoshida[26], and others.[6)] The background of these studies was the fact that short-term leases (use-right system) had been promoted by the government, which resulted in the emergence of problems related to beneficial expenses. Therefore, discussion in these studies seems to focus only on the legal framework concerning, and the calculation of, beneficial expenses. Meanwhile, Katsura[13] [14] conducted comprehensive and systematic analysis of lease contracts and beneficial expense-related problems based on a detailed survey of arboricultural lands. Analysis by Katsura[13] [14] was from the perspective of contract and organizational economics, absent from other studies, and thus marked a milestone achievement in the study of farmland lease contracts and beneficial expenses.

With these preceding studies in mind, this paper's analysis is unique in the following three ways.

First, the target of this paper's analysis is upland farm fields. Past studies on agricultural land lease contracts and land improvement investment mostly focused on arboricultural lands (Katsura[13] [14], Tashiro[25]) and very few targeted upland farm fields (Kurauchi and Kondo[15]). Kurauchi and Kondo[15: p. 4] point out that land lease for upland farming comprises not only the issues related to each aspect of land rent, contract period and beneficial expenses, but also various elements that require analysis of mutual regulations and complementary relationships among these aspects, and therefore the choice of upland farm fields as the analysis target is of great significance.

Second, the choice of lease contract type (use-right establishment or off-the-record contract basis) is discussed in this paper. Although Katsura[13] [14] stated that the stability of lease contracts influences incentives for land improvement investment, he did not mention the determinant factors for choice of lease contract. In reality, landlords and tenants choose the type of lease contract according to their characteristics. If it is assumed that there is a relationship between a contract's stability and the incentives for investment, it is important to discuss how the choice of a lease contract affects stability of the contract.

Third, the data set used for this paper is highly unique. As described above, past empirical studies of lease contracts did not sufficiently reflect the characteristics of both the landlord and the tenant of a lease contract in the econometric analysis. Our study employed a specially arranged questionnaire, which enabled us to obtain data on attributes of both landlords and tenants, and to control endogenous problems. This study is also sig-

nificant in terms of building up an effective data set in Japan, where very few econometric analyses of farmlands have been conducted using micro data.

2. Comparison of Lease Contracts and Investment in Land

Here, land lease contracts on an off-the-record contract basis and on an establishing use-right basis are compared. Also, the legal framework concerning claims for reimbursement of beneficial expenses is outlined and the relationship between land lease contracts and land improvement investment is clarified.

1) Comparison between off-the-record lease contracts and use right-based contracts[7)]

For tenants, the greatest advantage of a contract establishing use-rights over an off-the-record contract is that the terms, including the amount of rent and contract period, are made clear and therefore management stability is secured (Inamoto[10]). The political aim of establishing use-right is to promote short-term leases. But with the contract period clarified (though short), farmers can feel safe to invest in land improvement. Moreover, under establishing use-right contracts, the level of rent is often determined according to a standard rent, which prevents the rent from soaring. However, since this advantage of lower rent on the tenant side is a disadvantage for landowners, landowners often prefer off-the-record contracts.

On the landowner side, the advantage of an establishing use-right contract is obviously that it is easy for them to ask for the return of the leased land. Meanwhile, there is also a disadvantage in establishing use-right, which is lack of flexibility. Unlike off-the-record contracts, concluded annually, under a use right-based contract in which a certain period is specified, the landowner is unable to farm the land until the contract period expires. It is fine if the landlord is a non-farmer landowner or an aged farmer with no successors. But if the landlord is a farmer who values highly the opportunity cost of loss of flexibility (e.g., facility-grown vegetable/flower farmers temporarily renting out their excess farmland), an off-the-record contract is often preferred to a use-right-based contract.

There are also institutional obstacles that inhibit landowners from concluding lease contracts on an establishing use-right basis. Such institutional problems include agricultural lands for which lease-for-use right was established upon receipt of management transfer pension under the farmers' pension system, and agricultural lands to which inheritance tax deferral is applied (Ando[3]).[8)] Once a landowner lends a large area of his/her land under the legal lease scheme, the landowner will lose various rights including the right to purchase farmlands (over 50a), the status as the insured of the farmer's pension (over 50 a) and the right to be elected to agricultural committees (over 10a). This is one of the factors that inhibits landowners from concluding establishing use-right contracts.

Meanwhile, the advantage of an off-the-record contract over a use-right-based contract is contract simplicity, meaning low transaction costs (Allen and Lueck[2]). As Fukuda [6: p. 38] pointed out, an off-the-record lease contract is based on the relationship of trust between individuals and its transaction costs are usually low. If such contract is concluded under the legal scheme, i.e., in a written form through establishment of a use-right, the transaction cost will rise.

2) Legal framework concerning claims for reimbursement of beneficial expenses and lease contracts

For both off-the-record contracts and use-right-based contracts, the right to claim reimbursement of beneficial expenses is guaranteed by the Civil Code. To be precise, under the unjust enrichment doctrine of Article 703 of the Civil Code, Article 196 (2) of the Civil Code ensures the "possessors' right to claim reimbursement of expenses" ("With respect to beneficial expenses including amounts paid by a possessor to improve Thing in his/her possession, limited to cases where there is a current increase in value, the possessor may, at the election of the person recovering the Thing, have the person recovering the Thing reimburse monies the possessor paid or the amount of the increased value").[9)] Therefore, tenants are able to recover unamortized expenses for land improvement investment upon completion of the lease contract regardless of the type of lease contract (off-the-record

or establishing use-right basis).

In fact, few tenants have exercised the right to claim reimbursement of beneficial expenses. This does not, however, mean no problems have arisen relating to beneficial expenses. The reality is that beneficial expense-related problems do not appear to have occurred because necessary land improvement investment has not been made. And the problem of underinvestment in leased lands, or so-called "holdup" problem, has occurred instead.

The holdup problem is more likely to appear in off-the-record lease contracts, which do not specify contract period, than in establishing use-right contracts, which specify contract period. Regarding this point, Katsura[14: p. 261, 265] mentions the beneficial expense-related problem in off-the-record contracts and the relationship between contract period and composting. Katsura[14] argues based on interviews with farm land tenants in Hokkaido that under an off-the record contract, landowner benefit is often prioritized when a beneficial expense-related problem arises, and that with a lease period shorter than the effective fertilizer period, farmers cannot compost the land for fear that the land will be leased to others."

The above can be summarized as follows: although the Civil Code allows tenants the right to claim for reimbursement of beneficial expenses, it costs a lot to actually exercise the right because of its vagueness. Beneficial expense-related troubles can be avoided by concluding a lease contract which establishes use-rights between the landlord and the tenant. But when the lease contract is an off-the-record type, the likelihood of the "holdup" problem is higher.

3. Preliminary Observations on Lease Contracts and the Lease Market in Atsumi-cho

Here, characteristics of the lease market and lease contracts in Atsumi-cho are outlined within the parameters of the analysis below.

1) Structure of farmland lease market: Landlords have strong bargaining power

The first feature is related to the structure of the lease market. Figure 1 shows changes in indexes of tenant farmers and landlord farmers. Here, according to Tabata[23], the ratio to total farm households of farm households with full-time farmers younger than 60 is used as the tenant farmer index, and the ratio of full-time farm households with no working-age men, Class 2 part-time farm households with household heads in full-time employment and Class 2 part-time farm households with household heads running a business to total farm households is used as the landlord farmer index. As clearly shown in the figure, in Atsumi-cho since 1980 the tenant farmer index has been consistently higher than the landlord farmer index. This contrasts markedly with the national and prefectural averages. This trend indicates that there is a large demand for land lease in the lease market of Atsumi-cho, giving landlords strong bargaining power. [10)]

Moreover, the land lease market of Atsumi-cho has another unique point in that the level of rent has not changed for several decades. Though the reason is not certain, this trend indicates that the level of rent does not function effectively in compensating for the imbalance between supply and demand in the lease market, and that the level of rent is not a significant determinant factor in decision-making by landlords and tenants concerning land lease contracts.

2) Farmland Lease contracts: Most leases are based on off-the-record contracts

The second feature is that many lease contracts are on an off-the-record basis. Table 1 shows the area of farmland on legal lease in Atsumi-cho from 1991 to 2000. *Transfer and Conversion of Agricultural Land* statistics provide the flow of leased land area, from which I totaled the figures of 1991 through 2000 to obtain the total area of agricultural land on legal lease as of 2000. The reason why the areas for 10 years between 1991 and 2000 were totaled is that, as explained later, most lease contracts, whether under Article 3 of the Agricultural Land Act or based on establishing use-right, have contract periods within 10 years.

As shown in the table, the total land area on legal lease as of 2000 is 93.5 ha (22.6 ha under Article 3 of the Agricultural Land Act, 70.9 ha based on establishing use-right). [11)] Meanwhile, the *Census of Agriculture and*

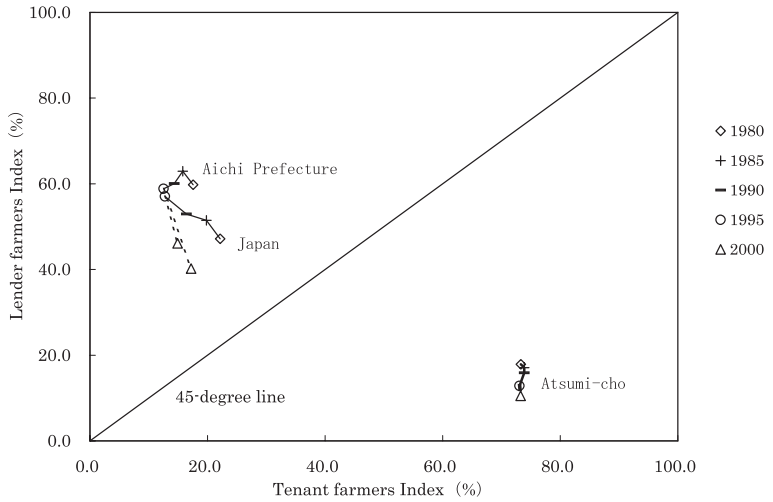

Figure 1. Changes in indexes of the landlord farmers and tenant farmers

Source: *Census of Agriculture*.

Notes: 1) The tenant farmer's index is the ratio of farm households with full-time farmers below 60 to total farm households. The landlord farmer's index is the ratio of full-time farm households with no productive-age men and Class 2 part-time farm households with the household heads having a full-time job or running a business to total farm households. But for 2000, the ratio is to the number of commercial farm households.

2) Considering the fact that figures for 2000 are based on commercial farm households and not linked to other years, dotted lines are used.

Table 1. Transfer of farmlands under the agricultural land act and the act on promotion of improvement of Agricultural Management Foundation

Year	Lease establishment			
	Article 3 of agricultural land act		Act on promotion of improvement of Agricultural Management Foundation	
	Number of cases	Area (ha)	Number of cases	Area (ha)
1991	14	2.5	78	16.6
1992	8	3.2	10	2.1
1993	3	2.6	9	2.0
1994	6	1.4	4	0.9
1995	9	4.1	13	3.0
1996	6	2.0	30	7.2
1997	6	1.6	17	3.4
1998	7	0.9	94	19.4
1999	2	0.7	53	11.1
2000	9	3.6	22	5.2
Total	70	***22.6***	330	***70.9***

Source: *Transfer and Conversion of Agricultural Land*.

Note: Act on promotion of use of agricultural land before 1992, and act on promotion of improvement of Agricultural Management Foundation after 1993.

Forestry for 2000 shows that the total area of leased farmland in stock including that under off-the-record lease contracts is 550 ha (rice paddies: 63 ha, farm fields: 487 ha). This figure is greatly different to the area of legally leased land in *Transfer and Conversion of Agricultural Land*. The difference between the area of land on legal lease and the Census's total leased land area appears to correspond to the area of land on lease under off-the-record contracts. Because Atsumi-cho does not offer incentives for leases based on establishing use-right, such as subsidies to promote farmland liquidity, it can be concluded without political bias that in Atsumi-cho, farmers simply prefer off-the-record lease contracts.

3) Contract period: Leases under use-right-based contracts and under Article 3 of Agricultural Land Act have long contract periods

Next, characteristics of contract period will be outlined. Since contract periods are basically not specified in off-the-record leases, discussion here focuses on the contract period of establishing use-right leases and leases under Article 3 of the Agricultural Land Act. Table 2 shows the number of establishing use-right leases and the number of leases under Article 3 of the Agricultural Land Act from 1994 to 2003, classified by the length of contract period.

In establishing use-right leases, the most common contract period is 10 years (47.8% of all use-right-based leases), followed by 5 years (16.3%), 6 years (13.0%) and 20 years (10.1%). In leases under Article 3 of the Agricultural Land Act, the most common contract period is 5 years (32.3% of all leases under Article 3 of Agricultural Land Act), followed by 20 years (30.8%) and 10 years (23.1%). In both use-right-based leases and leases under Article 3 of the Agricultural Land Act, most contracts have 10 year or longer contract periods.

4) Rent: Rent level is low

Next, though not directly related to the statistical analysis presented below, features of land rents will be explained to clarify and enrich the picture of the lease market.

Table 2. Number of leases established by contract period

Contract period	Establishing use-right	Agricultural Land Act, Article 3
	Number of cases (%)	Number of cases (%)
1 year	1 (0.3)	0 (0.0)
2 years	3 (0.8)	0 (0.0)
3 years	30 (8.2)	4 (6.2)
4 years	0 (0.0)	2 (3.1)
5 years	60 (16.3)	***21*** (32.3)
6 years	48 (13.0)	1 (1.5)
7 years	1 (0.3)	0 (0.0)
8 years	4 (1.1)	0 (0.0)
9 years	2 (0.5)	0 (0.0)
10 years	***176*** (47.8)	15 (23.1)
11 years	0 (0.0)	0 (0.0)
12 years	0 (0.0)	0 (0.0)
13 years	0 (0.0)	0 (0.0)
14 years	0 (0.0)	0 (0.0)
15 years	5 (1.4)	2 (3.1)
16 years	0 (0.0)	0 (0.0)
17 years	1 (0.3)	0 (0.0)
18 years	0 (0.0)	0 (0.0)
19 years	0 (0.0)	0 (0.0)
20 years	37 (10.1)	20 (30.8)
Total	368	65

Source: Data of Atsumi-cho Agricultural Committee.
Note: This data shows the total numbers between 1994 and 2003.

Table 3. Relationship between contract rent and land prices (cabbages)

Contract rent	Number of cases(%)	Land price	Number of cases(%)
Lease for use	9 (5.2)	:	:
0.0-0.5	1 (0.6)	:	:
0.5-1.0	4 (2.3)	:	:
1.0-1.5	10 (5.8)	:	:
1.5-2.0	36 (20.8)	:	:
2.0-2.5	***46*** (26.6)	200-250	2 (1.4)
2.5-3.0	22 (12.7)	250-300	8 (5.5)
3.0-3.5	38 (22.0)	300-350	19 (13.1)
3.5-4.0	1 (0.6)	350-400	35 (24.1)
4.0-4.5	0 (0.0)	400-450	***71*** (49.0)
4.5-5.0	0 (0.0)	450-500	3 (2.1)
5.0-5.5	2 (1.2)	500-550	4 (2.8)
5.5-6.0	1 (0.6)	550-600	2 (1.4)
6.0-6.5	0 (0.0)	600-650	1 (0.7)
6.5-7.0	0 (0.0)	:	:
7.0-7.5	1 (0.6)	:	:
Total	171	Total	145
Average	2.3	Average	384.8
Standard deviation	0.9	Standard deviation	57.4

Source: Data of Atsumi-cho Agricultural Committee.
Notes: 1) Number of cases of lease-right establishment and paid transfer of land ownership under the Act on Promotion of Improvement of Agricultural Management Foundation.
2) This data shows the total numbers between 1994 and 2003.

Table 3 shows the relationship between contract rents and land prices, in reference to the number of cases of lease-right establishment and paid transfer of land ownership under the Act on Promotion of Improvement of Agricultural Management Foundation. To make it easier to evaluate land-yield, the table presents the contract rents and land prices side by side. Also for the convenience of discussing the relationship between contract rents and land prices, only the land growing cabbages is presented.

As shown in the table, the most common contract rent level is 20,000-25,000 yen/10 a (26.6% of all), followed by 30,000-35,000 yen/10 a (22.0%), 15,000-20,000 yen/10 a (20.8%), and 25,000-30,000 yen/10 a (12.7%).[12] Compared to the standard farmland rent of 18,000 yen/10 a, the rent level is relatively high. As to the land price level, 4.0-4.5 million yen/10 a is most common (49.0% of all), followed by 3.5-4.0 million yen/10 a (24.1%) and 3.0-3.5 million yen/10 a (13.1%).

The land yield rate obtained from the average contract rent and land price is 0.6%, which is extremely low. This low yield is, however, not caused by the high land prices reflecting the conversion prices but by the low rent level. In fact, according to an interview survey, net income of land is as high as nearly 200,000 yen per 10 a, though it fluctuates annually,[13] and therefore the land yield in terms of land net income is not so low. This means that because the rent level is too low, the land yield rate becomes low as a result.[14]

Features of lease contracts and the lease market in Atsumi-cho can be summarized as follows:

The lease market of Atsumi-cho seems to have a structure in which lenders of farmland have strong bargaining power. Therefore, tenants only have the choice of whether or not they accept the contract offered by landlords, and have little chance for further negotiation. As to the types of lease contracts, off-the-record contracts are most common while leases based on establishing use-right and under Article 3 of the Agricultural Land Act are very few. If lease contracts based on establishing use-right or under Article 3 of

the Agricultural Land Act are concluded, their contract period is often longer than 10 years. With these characteristics of many off-the-record leases and strong bargaining power on the landlord side, the likelihood of beneficial expense-related problems is extremely high in Atsumi-cho.

4. Determinant Factors for Choice of Lease Contract Type and Land Improvement Investment

1) Data outline

The data used for this study is the results of a survey on future agricultural promotion in the Atsumi Peninsula region conducted by the National Agricultural Engineering Research Institute (now The Japanese Institute of Irrigation and Drainage) targeting farmers in Atsumi-cho, Aichi Prefecture. This survey was conducted in November and December, 2005, with the aim of gathering the opinions of farmers concerning the promotion of agriculture in the Atsumi Peninsula region.

To ensure statistical effectiveness, the questionnaire was sent to 1,001 farm households selected at random from the membership list of Atsumi-cho Land Improvement District (of which 7 were returned due to wrong address, etc.). In the random sampling, considering the difference in the number of farm households (including landowning non-farm households) between areas (former *mura* (villages) and *ōaza* districts), 185 households were selected from former Izumi-mura, 566 were selected from former Fukue-cho, and 250 were selected from former Iragomisaki-mura.[15] The final response rate was 38.5 %. This paper presents the analysis using the data on farm fields of 66 tenant farm households that can provide all necessary variables for quantitative analysis.[16]

2) Descriptive statistics

Attributes of the 66 sample farm households' 311 leased farm fields are outlined below.

(a) Attributes of sample farm households

Table 4 shows the attributes of sample farm households. Eleven of them located in former Izumi-mura (16.7% of all households), 44 are in former Fukue-cho (66.7%) and 11 are in former Iragomisaki-mura (16.7 %). Compared to the number of questionnaires sent to each area, the proportion of sample households in former Fukue-cho is rather high. Regarding age of farm managers (person playing the central role in all aspects of farm management in a farm household), those of 31 households are in their 50s, ac-

Table 4. Attributes of sample farm households

Location	Former Izumi-mura		Former Fukue-cho		Former Iragomisaki-mura	
	11 (16.7)		44 (***66.7***)		11 (16.7)	
Age	20s	30s	40s	50s	60s	**70s**
	1 (1.5)	8 (12.1)	9 (13.6)	31 (***47.0***)	15 (22.7)	**2** (**3.0**)
Number of family members engaged in agriculture	1	2	3	4	5	
	1 (1.5)	25 (***37.9***)	15 (22.7)	23 (***34.8***)	2 (3.0)	
Certified farmer	Yes		No		No response	
	36 (***57.1***)		27 (42.9)		3 —	
Farm successor	Have successor		No successor			
	33 (50.0)		33 (50.0)			

Source: Questionnaire.
Note: Figures show the number of households. Figures in parentheses are ratios.

counting for the largest percentage (47.0% of all), followed by 15 households with farm managers in their 60s (22.7%), 9 households with those in their 40s (13.6%) and 8 households with those in their 30s (12.1%). Two family members engaged in agriculture was the most common (37.9% of all), followed by 4 (34.8%) and 3 (22.7%). 36 of the sample farm households are "certified farmers," accounting for over 50%, which indicates that a relatively large number of households have farm successors (a person aged 15 or more who will succeed to farm management in the next generation).

(b) Attributes of farm fields leased to sample farmers

Table 5 shows the attributes of the land leased to sample farmers. Most lease contracts are on an "individual and personal (oral)" basis (91.4% of all contracts). 70% of lease rents are within the ranges of 20,000-30,000 yen/10 a and 30,000-40,000 yen/10 a. This is about the same as the average rent of Atsumi-cho as described above. Most leases started in the 1990s (57.8% of all) and the 2000s (25.6%), indicating many lease contracts are relatively new.

Many landlords and tenants are in a kinship relation (36.4%), and they often live in the same neighborhood (52.6%). It is natural that a farmer first tries to rent farmland from relatives or landowners in the same neighborhood. In the meantime, however, the ratio of landlords and tenants who are in a friendship or acquaintance relation as well as the ratio of landlords residing outside the

Table 5. Attributes of lands leased to sample farmers

Contract form	Agricultural Land Act Art. 3		Establishing use-right	Individual and personal (written)		Individual and personal (oral)
	3 (1.0)		16 (5.3)	7 (2.3)		275 (***91.4***)
Current lease rent (10,000 yen/10a)	0.0-1.0	1.0-2.0	2.0-3.0	3.0-4.0	4.0-5.0	5.0 or above
	20 (6.6)	49 (16.3)	85 (***28.2***)	129 (***42.9***)	5 (1.7)	13 (4.3)
Lease start year	1970 or before	1970s	1980s	1990s	2000s	
	5 (1.6)	23 (7.5)	23 (7.5)	178 (***57.8***)	79 (25.6)	
Relationship between tenant and landlord	Relative		Acquaintance/friend	Neighbor		Other
	114 (***36.8***)		122 (***39.4***)	50 (16.1)		24 (7.7)
Age of landlord	30-40	40-50	50-60	60-70	70 or older	
	12 (3.9)	32 (10.4)	85 (27.7)	119 (***38.8***)	59 (19.2)	
Residence of landlord	Inside the tenant's neighborhood		Outside the neighborhood but in the same former *mura*	Outside tenant's former *mura* but in Atsumi-cho		Outside Atsumi-cho
	163 (***52.6***)		15 (4.8)	119 (***38.4***)		13 (4.2)
Landlord's degree of engagement in agriculture	Full-time farmer		Class 1 part-time farmer	Class 2 part-time farmer		Landowning non-farmer
	114 (***36.9***)		28 (9.1)	18 (5.8)		149 (***48.2***)

Source: Questionnaire.
Note: Figures show the number of farm fields. Figures in parentheses are ratios.

tenant's former *mura* but in Atsumi-cho are also high. ("In a friendship or acquaintance relation": 39.4%, "outside the tenant's former *mura* but in Atsumi-cho": 38.4%). This indicates that, in the course of expanding the scale of management, tenants have found landlords beyond the border of kinship and neighborhood.

The table also shows that many landlords are in their 60s and 70s (38.8%), and the ratio of landowning non-farm households is high (48.2% of all). But there are also many landlords that are full-time farmers (36.9%), indicating that even full-time farmers, if they are engaged in facility-based farming, often lease out their excess farmland. In Atsumi-cho, not only landowning non-farm households but also full-time farm households can be landlords, which is a unique trend that is rarely seen in other regions.

3) Measurement model and definition of variables

(a) Land improvement investment in Atsumi

Before presenting the measurement model, the form of land improvement investment used for measurement should be determined. Actions considered to comprise land improvement investment in Atsumi-cho are application of compost (cow/horse manure, bark compost), deep plowing (replacing surface soil with subsoil) and soil dressing. According to interviews with land tenants, applying compost every 2 or 3 years costs about 30,000 yen/10 a and deep plowing every 5 years costs about 50,000 yen/10 a. Few tenants hesitate to invest in compost application and deep plowing because their effects are short-term and costs are low. On the other hand, soil dressing is an action with long-term impact, even semipermanently in some cases, and it costs as much as 500,000–600,000 yen/10 a. Therefore, whether or not to conduct soil dressing is an important decision for tenants. Moreover, soil dressing is particularly significant in Atsumi-cho, for purposes other than improving productivity. Since Atsumi-cho is in a typhoon-prone area, without soil dressing to raise the ground level of farm fields, fields may be flooded when a typhoon strikes, causing root rot on cabbages and resulting in a substantial reduction in yield. In short, soil dressing is significant for Atsumi-cho in terms not only of improving productivity through soil improvement but also of avoiding risk of damage from typhoons. Bearing this in mind, soil dressing is determined as the form of land improvement investment to be used for measurement.

(b) Proposing hypotheses

The purpose of our quantitative analysis is to verify the following hypotheses.

Hypothesis I: Farmers are encouraged more to conduct soil dressing under a written contract.

This Hypothesis is to clarify the relationship between the stability of contracts and incentive for investment. Here, we need to pay attention to the endogenous problems in each contract type. The relationship between contract types and investment in soil dressing is described in Table 6. The table shows that under oral contracts, 67 farm fields (54.9% of oral contracts) made no investment in soil dressing and 55 farm fields (45.1%) have made investment in soil dressing, while under written contracts, 4 farm fields (23.5% of written contracts) made no investment in soil dressing and 13 farm fields (76.5%) have made investment in soil dressing. The proportion of farm fields that have made investment in soil dressing is higher under written contracts. Fisher's exact test proves the statistical significance of this relationship (5% level). Although the result of cross-tabulation indicates that there is a significant relationship between contract type and soil investment, we cannot simply conclude that written contracts raise incentives to invest in soil dressing, as we need to take into consideration the possibility that the contract type is an endogenous variable. Discussion of this matter should be made after checking the endogenous characteristics of each contract type.

Hypothesis II: Farmers are encouraged more to conduct soil dressing if they can trust landowners.

"Trust" here refers to the "subjective belief" of the tenant that the landlord will behave opportunistically (e.g., asking for return of leased farmland immediately after the tenant makes an investment in the land, etc.). It is impossible for a tenant to know in advance whether the landlord will actually exhibit opportunistic behavior or not. But

Table 6. Relationship between contract type and investment in soil dressing

	Oral contract	Written contract	Total
No investment in soil dressing	67 (54.9)	4 (23.5)	71
Invested in soil dressing	55 (45.1)	13 (***76.5***)	68
Total	122	17	139

Source: Questionnaire.

Notes: 1) Figures show the number of farm fields. Figures in parentheses show the ratio in each contract type.
2) Written contract refers to leases under Article 3 of the Agricultural Land Act and leases based on establishing use-right and written off-the-record leases. Oral contract refers to off-the-record leases concluded orally.
3) 17 farm fields under written contract include 1 farm field under Article 3 of the Agricultural Land Act, 12 farm fields based on establishing use-right and 4 farm fields under written off-the-record contracts.
4) The result of a Fisher's exact test proves 5% level of significance.

the tenant seems to form some subjective belief regarding the possibility that the landlord may behave opportunistically. Thus, when the landlord's attributes (degree of engagement in agriculture, age, etc.) and relationship with the tenant in terms of kinship and geographical proximity can assure the tenant that the landlord will not behave opportunistically, the tenant can have a strong incentive to invest.[17)]

The following are the hypotheses proposed regarding the choice of contract type.

Hypothesis III: When there is a trust relationship between the landlord and the tenant, oral contracts are preferred to written contracts.

A trust relationship between landlord and tenant here refers to a relationship based on kinship or geographical proximity. When there is a trust relationship between landlord and tenant, they seem to prefer oral contracts to written contracts, which require transaction expenses (costs for documentation). From a similar viewpoint, Allen and Lueck[2] proved the presence of trust between landlord and tenant to be a determinant factor for choices of oral or written contract, and annual or multi-year contract, using the variable parameters of "Landowner and farmer were related" and "Landowner and farmer knew each other prior to lease."

Hypothesis IV: When the opportunity cost of loss of flexibility is high for the tenant, oral contracts are preferred to written contracts.

Under an oral contract, which both the landlord and tenant consider to be an annual contract, it is easy for the landlord to ask for return of the leased land. On the other hand, once a written contract is concluded, the landlord is unable to ask for return of the leased land except by means of termination by consent. Thus, landlords who highly value the opportunity cost of loss of flexibility are likely to prefer oral contracts to written contracts. In relation to this point, Bandiera[4] demonstrated that when (1) landlord is female, (2) landlord belongs to the aristocracy, or (3) landlord lives in a different town, long-term contracts are often preferred to short-term contracts because they are unlikely to get engaged in agriculture again.

(c) Measurement model

To verify the above hypotheses, reduced form equations (1) and (2) below are used as the measurement formulas. Here, $Contract_{ij}$ and $Investment_{ij}$ represent the contract type and the presence of investment for soil dressing. $Contract_{ij}^{*}$ and $Investment_{ij}^{*}$ are latent variables. $Trust_{ij}$ and $Flexibility_{ij}$ are proxy variables for the trust on the landlord and the landlord's opportunity cost of flexibility loss. If the contract type is a complete exogenous variable, measurement can be done by applying a Probit Model for equations (1) and (2) independently. But considering the possibility of the contract type being a endogenous variable, measurement here

was conducted using the Bivariate Probit Model.[18] The parameter estimation method adopted is the maximum likelihood method.

The existence of an endogenous problem is represented by the presence of a correlation between the disturbance term ε_{ij} relating to the choice of contract type in equation (1) and the disturbance term μ_{ij} relating to the choice for soil-dressing investment in equation (2). Therefore, given that the covariance of equations (1) and (2) $Cov[\varepsilon_{ij}, \mu_{ij}]$ is ρ as shown in equation (3), if ρ is zero, we can consider that there is no endogenous problem and it is appropriate to use a Probit Model for calculation of each of equations (1) and (2) independently.[19]

$$Contract_{ij}^{*}=\alpha' Trust_{ij}+\beta' Flexibility_{ij}+\varepsilon_{ij}$$
$$i=1, \ldots, n \quad j=1, \ldots, m$$
$$Contract_{ij}=\begin{cases}1, & Contract_{i}^{*}>0\\ 0, & Contract_{i}^{*}\le 0\end{cases} \tag{1}$$

$$Investment_{ij}^{*}=\gamma' Contract_{ij}+\delta' Trust_{ij}+\mu_{ij}$$
$$i=1, \ldots, n \quad j=1, \ldots, m$$
$$Investment_{i}=\begin{cases}1, & Investment_{i}^{*}>0\\ 0, & Investment_{i}^{*}\le 0\end{cases} \tag{2}$$

$$E[\varepsilon_{ij}]=E[\mu_{ij}]=0$$
$$Var[\varepsilon_{ij}]=Var[\mu_{ij}]=1 \tag{3}$$
$$Cov[\varepsilon_{ij}, \mu_{ij}]=\rho$$

For measurement, the US Stata Corp's Stata 9 is used.

Definitions of variables are provided in Table 7. Explained variable Contract Type is defined to be 1 for a written contract and 0 for an oral contract, and Investment is defined to be 1 when soil-dressing investment has been made and 0 when soil-dressing investment has not been made. In the survey tenants were asked whether soil dressing was necessary for each farm field and then whether they had actually invested. The farm fields for which the tenants considered soil dressing was not necessary were excluded from the measurement target. Consequently, of 311 farm fields of 66 tenant farmers, 139 farm fields were used as samples for the measurement after omitting 172 farm fields that did not require soil dressing.[20]

Explanatory variables are the type of contract (Contract Type), tenant's age (Tenant_Age), kinship relation between tenant and landlord (Kinship), geographical proximity of tenant and landlord (Residence), landlord's age (Landlord_Age) and landlord's degree of engagement in agriculture (Non-Farm_Landlord).

Contract Type is an explanatory variable to verify Hypothesis I. Allowing for the endogenous problem of contract type, if the parameter marked is positive and significant, Hypothesis I can be supported.

For verification of Hypothesis II, the kin-

Table 7. Definitions of variables

Variable	Definition	Descriptive statistics	
		Average	Standard deviation
Investment	Soil dressing: 1 when soil-dressing investment has been made, 0 when soil-dressing investment has not been made	0.49	
Contract Type	Contract type: 1 for written contract, 0 for oral contract	0.12	
Tenant_Age	Tenant's age:	52.4	9.9
Kinship	Relation between tenant and landlord: 1 for kinship relation, 0 for others	0.40	
Residence	Residence of tenant and landlord: 1 when living in the same former *mura*, 0 for others	0.63	
Landlord_Age	Landlord's age: 1 when 70 or older, 0 for others	0.17	
Non-Farm_Landlord	Landlord's degree of engagement in agriculture 1 for landowning non-farmer, 0 for others	0.53	

ship relation between tenant and landlord (Kinship), geographical proximity of tenant and landlord (Residence), landlord's age (Landlord_Age) and landlord's degree of engagement in agriculture (Non-Farm_Landlord) are set as the proxy variables for trust in the landlord.

When the landlord and tenant are in a kinship relation, the landlord is unlikely to behave opportunistically. Therefore, the parameter for the kinship relation between tenant and landlord (Kinship) is expected to be positive.

When the landlord and tenant belong to the same neighborhood (former *mura*), opportunistic behavior by the landlord is likely to be deterred due to internal monitoring. Therefore, the geographical proximity of tenant and landlord (Residence) is expected to be positive.

According to interviews with tenants, when the landlord is an old, landowning non-farmer, the landlord will not ask for return of leased land except in the most unusual circumstances because they are unlikely to engage in agriculture again. Thus, the parameters of landlord's age (Landlord_Age) and landlord's degree of engagement in agriculture (Non-Farm_Landlord) are expected to be positive.

For verification of Hypothesis III, the kinship relation between tenant and landlord (Kinship), and geographical proximity of tenant and landlord (Residence) are used as the proxy variables for the relationship of trust between landlord and tenant. Since the variable Contract Type is defined as 1 for a written contract and 0 for an oral contract, the signs for both kinship relation between tenant and landlord (Kinship) and geographical proximity of tenant and landlord (Residence) are expected to be negative.

To confirm the validity of Hypothesis IV, landlord's age (Landlord_Age) and landlord's degree of engagement in agriculture (Non-Farm_Landlord) are set as the proxy variables for the landlord's opportunity cost of loss of flexibility. When the landlord is an old, landowning non-farmer, the opportunity cost of loss of flexibility associated with conclusion of a written contract is small because the landlord is unlikely to engage in agriculture again. Therefore, landlord's age (Landlord_Age) and landlord's degree of engagement in agriculture (Non-Farm_Landlord) are both expected to be positive.

4) Results of parameter measurement

First, to verify the presence of endogenous

Table 8. Results of measurement (Bivariate Probit Model)

	Contract Type	Expected sign	Investment	Expected sign
Constant	−1.930*		−0.228	
	(1.055)		(0.684)	
Contract Type	−		1.507	+
			(1.222)	
Tenant_Age	0.004	−	−0.014	?
	(0.018)		(0.012)	
Kinship	−0.756**	−	0.615**	+
	(0.369)		(0.260)	
Residence	0.141	−	0.431**	+
	(0.338)		(0.242)	
Landlord_Age	0.346	+	0.015	+
	(0.365)		(0.324)	
Non-Farm_Landlord	0.888**	+	0.462	+
	(0.366)		(0.324)	
Number of samples		139		
Log likelihood		−127.953		
ρ		−0.425		
Wald test of ρ		$\chi^2(1)$ 0.224 (Prob. $>\chi^2$=0.636)		

Notes: 1) ***, ** and * indicate significance levels of 1%, 5% and 10%, respectively. Figures in parentheses show standard errors.
2) The figure in parenthesis for the Wald test is the degree of freedom.

problems in contract types, the results of measurement using Bivariate Probit Model are shown in Table 8. The result of a Wald test did not reject the null hypothesis that the covariance ρ of equations (1) and (2) is zero. This suggests that there is not necessarily an endogenous problem in contract types, and therefore measuring each of the equations (1) and (2) independently using the Probit Model can be permitted. Thus, the results of measuring the equations (1) and (2) using the Probit Model are explained below.

Table 9 shows the results of calculation of equations (1) and (2) using the Probit Model. As a result of the likelihood ratio test under the Probit Model, the null hypothesis that all parameters except constant terms are zero was rejected with a significance level of 1% in measurements of both Contract Type and Investment. Pseudo R^2 was 0.158 in measurement of Contract Type and 0.122 in measurement of Investment, indicating the model's goodness of fit is within an acceptable range.

As predicted, Contract Type shows a significant positive parameter (significance level 5%). In farm fields under written contracts, the probability of investment in soil dressing is high due to the sense of security brought by the contracts. This result demonstrates that the type of contract influences the tenant's choice of behavior concerning investment, supporting Hypothesis I.

Next, the results of parameters concerning Hypothesis II are explained below.

The kinship relation between tenant and landlord (Kinship) shows a significant positive parameter (with significance level 5%). Because the parameter is positive, the measurement result supports the hypothesis. In other words, when the tenant and landlord are in a kinship relation, the tenant can predict that the landlord will not behave opportunistically and therefore the tenant can invest in soil dressing. This is consistent with Katsura's statement [13: p. 35] that the tenant does not feel insecure when the landowner is a relative, but feels insecure when the landowner is not a relative at all. Whether the tenant feels insecure depends on the relationship with the landowner. A relative may ask the tenant to purchase the land but never ask for return of the land.

The geographical proximity of tenant and landlord (Residence) shows a significant positive parameter (with significance level 5%). When the tenant and landlord live in the same neighborhood (former *mura*), the landlord is unlikely to behave opportunistically because an internal monitoring function works inside the neighborhood. Consequent-

Table 9. Results of measurement (Equation by Equation Probit Model)

	Contract Type	Expected sign	Investment	Expected sign
Constant	−1.818*		−0.163	
	(1.014)		(0.749)	
Contract Type	−		0.799**	+
			(0.384)	
Tenant_Age	0.002	−	−0.015	?
	(0.017)		(0.013)	
Kinship	−0.755**	−	0.543**	+
	(0.374)		(0.240)	
Residence	0.175	−	0.457**	+
	(0.333)		(0.237)	
Landlord_Age	0.315	+	0.077	+
	(0.370)		(0.303)	
Non-Farm_Landlord	0.875**	+	0.576**	+
	(0.365)		(0.238)	
Number of samples	139		139	
Log likelihood	−43.491		−84.574	
Likelihood ratio test result	$\chi^2(5)$ 16.29***		$\chi^2(6)$ 23.48***	
Pseudo R^2	0.158		0.122	

Note: ***, ** and * indicate significance levels of 1%, 5% and 10%, respectively. Figures in parentheses show standard errors.

ly, the probability that the tenant will invest becomes high.

The landlord's degree of engagement in agriculture (Non-Farm_Landlord) shows a significant positive parameter (significant level 5%). This indicates that when the landlord is a landowning non-farmer, the tenant predicts that the landlord will not ask for return of the leased land and therefore the tenant is more encouraged to invest in soil dressing.

As to the choice of contract type, the kinship relation between tenant and landlord shows a significant negative parameter (significance level 5%) while the parameter of geographical proximity of tenant and landlord (Residence) is not significant. As the kinship relation between tenant and landlord (Kinship) supports Hypothesis III, off-the record leases are likely to be chosen to save the transaction costs associated with contracts when the tenant and landlord are in a kinship relation.

The landlord's degree of engagement in agriculture (Non-Farm_Landlord) shows a significant positive parameter (significance level 5%), supporting the validity of Hypothesis IV. When the landlord is a landowning non-farmer, the possibility that the landlord will be engaged in agriculture again is extremely low. Reflecting this, many written contracts are concluded when the landlord is a landowning non-farmer.

5. Conclusion

This paper has discussed what factors influence decision-making relating to lease contracts of upland farmland and investment in land improvement by land tenants. In the farmland usufruct market of Atsumi-cho, demand for land on lease is great and therefore landlords have strong bargaining power. Under such farmland usufruct market structure, not only the tenant's attributes but the land lord's attributes influence the decision-making concerning the choice of lease contract type and the land improvement investment. Considering this point, actions by both landlord and tenant were simultaneously incorporated in the measurement model for the analysis of this paper. The major findings are as follows.

First, when an establishing use-right contract, which is a written contract, is concluded, land tenants are more encouraged to invest in the leased land. This indicates that contract type influences the incentive to invest.

Second, the role of trust was verified. It was revealed that trust in a landlord which is formed by the landlord's attributes such as kinship relations and geographical proximity with the tenant affects the tenant's investment behavior.

Third, as to the choice of lease contracts, it was found that the kinship relation between landlord and tenant, and flexibility on the landlord side, are determinant factors in the choice. This means that off-the-record lease contracts are preferred when the tenant and the landlord are in a kinship relation or when the landlord highly values the opportunity cost of loss of flexibility.

These results indicate that even under an off-the-record lease contract, trouble related to beneficial expenses can be avoided if there is a relationship of trust between the tenant and landlord. However, as they expand their farm management, farmers are not always able to find a land lender from among their relatives or residents of the same neighborhood. In fact they often lease land from strangers beyond the neighborhood border. Under such circumstances, the role of trust cannot serve as the only solution to the beneficial expense-related problems. To prevent the problem of underinvestment in leased land, it is necessary to clarify the landlord-tenant relationship by establishing use-rights. However, considering the structure of the land lease market in Atsumi-cho where the landlord side has strong bargaining power, a haphazard emphasis on the importance of establishing use rights is unlikely to encourage the making of contracts establishing use-right. Therefore, Agricultural Committees, etc. should take the initiative in setting rules for the reimbursement of beneficial expenses (e. g., defining beneficial expenses, determining calculation methods) and discussing measures to put the rules into practice.

Incidentally, the phenomenon of lack of land improvement investment associated with farmland transactions is not a problem unique to Atsumi-cho. Thus, the approach to analysis of this paper can also be applied to,

for example, Hokkaido, which is a typical upland farming area. For such an attempt, however, the analysis model needs to be modified according to two characteristic features of Hokkaido agriculture. One is that in Hokkaido, selling/purchasing farmland is as common as leasing. Purchasing farmland is the most effective measure to avoid the trouble associated with beneficial expenses. Although this paper does not expressly discuss the issue of farmland purchase, analysis of the choice between leasing and purchasing of farmland will be necessary if Hokkaido is targeted. The other point is that rural communities in Hokkaido have high fluidity due to lack of successors in the families and increasing farm abandonment (Tabata[22]). In a fluid community, social ties inside a community become weak and the internal monitoring function, an effective measure to prevent beneficial expense-related trouble, cannot work well. How these issues unique to Hokkaido can be incorporated into the model will be the key to effective analysis of Hokkaido.

1) "Off-the-record farming contract" refers to a lease contract concluded based only on a mutual agreement between the landlord and the tenant, without being subject to legal land-lease procedures (notification to and permit by Agricultural Committee). Basically, off-the-record farming contracts are considered to be lease contracts with no contract period specified. In this paper, off-the-record farming contracts are sometimes referred to as oral contracts, and contracts based on establishing use-right and contracts under Article 3 of Agricultural Land Act are sometimes referred to as written contracts.
2) Tahara-cho, Akabane-cho and Atsumi-cho have now merged to form Tahara City. (First, Tahara-cho and Akabane-cho merged on August 20, 2003 to become Tahara City, then Atsumi-cho was merged into Tahara City on October 1, 2005.)
3) Survey papers on leases of farmland include papers by Otsuka, Chuma and Hayami[19] and Huffman and Just[9].
4) Though different from stability of lease contracts, studies of stability of landowning and land improvement investment have been actively conducted targeting developing countries. See Besley[5] and Sakurai[20].
5) For criticism about this point, see Ackerberg and Botticini[1].
6) For a recent survey of beneficial expenses, see Ministry of Agriculture, Forestry and Fisheries[16].
7) Forms of farmland lease include off-the-record lease, establishing use-right lease, and lease under Article 3 of the Agricultural Land Act. Because leases under Article 3 of the Agricultural Land Act are rare today, only off-the-record leases and establishing use-right leases are focused on in this paper. A big difference between use-right-based leases and leases under Article 3 of the Agricultural Land Act is that the former are exempted from application of Article 19 of the Agricultural Land Act "Limitation to cancellation/renewal rejection."
8) According to a revision of the Agricultural Land Act on June 2009, inheritance tax deferral is applied even after a landlord leases out his/her farmland. For details of a revision of the Agricultural Land Act, see Takagi [24].
9) Article 59 of the Land Improvement Act stipulates, "When reimbursing the beneficial expenses paid for land improvement activities pursuant to provisions of Civil Code, the amount to be reimbursed shall be the amount of the increased value regardless of the provision of Article 196(2) of Civil Code."
10) Attention needs to be paid to the point that the tenant farmers' index includes facility-grown vegetable / flower farmers, whose demand for land is weak. Because there are many facility-grown vegetable/flower farmers as well as outdoor-grown vegetable farmers in Atsumi-cho, the tenant farmers' index is undeniably overvalued.
11) In Atsumi-cho, the decision between a lease under the Act on Promotion of Improvement of Agricultural Management Foundation (establishing use-right) and a lease under the Agricultural Land Act is left to farmers. Since the procedures for establishing use-right are simpler, few farmers choose lease contracts under the Agricultural Land Act.
12) Rent under an off-the-record lease contract for growing cabbages is 20,000-30,000 yen/10 a, which is an equivalent level to the rent under an establishing use-right contract.
13) A case of cabbages weighs about 10 kg and contains 6 cabbages (3 L size), or 8 cabbages (L size) or 9 cabbages (M size). The yield per 10 a is about 600 cases. The price of cabbages is usually about 700 yen per case, but it sometimes soars as high as 2,000 yen per case or falls as low as 200 yen.
14) One of the reasons why the rent is low despite strong bargaining power on the landlord side is the impact of the standard farmland

rent system. The standard farmland rent in Atsumi-cho has been within a low range of 18,000-20,000 yen/10 a since 1977. According to an interview survey, many farmers set the land rent referring to the standard rent level, and this indicates that the standard farmland rent system causes the low trend of actual rent level.

15) Atsumi-cho consists of former Izumi-mura, former Fukue-cho and former Iragomisaki-mura. Former Izumi-mura has 8 districts (*ōaza*) and 8 neighborhoods (*shūraku*), former Fukue-cho has 8 districts and 12 neighborhoods and former Iragomisaki-mura has 5 districts and 6 neighborhoods.

16) Concerning each farm field leased to tenants the questionnaire asked about "land-use category," "area," "crops," "contract type," lease start year," "relationship between tenant and landlord," "landlord's age," "tenant and landlord's residing neighborhoods," "landlord's degree of engagement in agriculture," "application of compost" and "investment for soil dressing."

17) According to the interview survey, many tenants complain about opportunistic behavior by landlords. Such complaints include: "I was asked to return the leased land immediately after soil dressing was completed, because the landowner wanted to sell the land to others. Disappointed, I replaced the soil I had just put in the land and put it on my own land at night." "Since the price of cabbages has consistently remained at a high level over the past few years, the facility-grown vegetable/flower farmers or fishermen asked for the return of leased land as they wanted to grow cabbages themselves." In relation to this point, some tenants say that when they purchase from the landowner leased land on which they have conducted soil dressing, they negotiate with the landowner to have the expenses of soil dressing deducted from the selling price.

18) Other ways to address the endogenous problems include application of the instrumental variable method and the Durbin-Wu-Hausman test. In this paper, considering the availability of data and the robustness of the model, the Bivariate Probit Model was employed.

19) There are many studies employing the Bivariate Probit Model to deal with endogenous problems. Among them, research by Miyata and Sawada[17], as well as the previously mentioned study by Bandiera[4], has an analytical viewpoint similar to this paper. Miyata and Sawada[17] picked up the case of an aquaculture business at the Saguling Dam, Indonesia, and examined the decision making of farmers concerning investment in aquaculture technology. Although decision-making for investment is affected by credit constraints faced by farmers, it is questionable whether it is right to consider credit constraints as an endogenous variable. To check this possibility of the presence of endogenous problems, Miyata and Sawada[17] simultaneously estimated the measurement formulas of credit constraints and investment using the Bivariate Probit Model. As a result of the estimate, covariance of the disturbance terms of the credit constraints equation and the investment equation turned out to be significantly negative. This reveals that some endogenous problems are present with regard to farmers' credit constraints, and that farmers' choice concerning investment in aquaculture technology and the presence of credit constraints are in a trade-off relation. The issue of endogenous problems is an important topic in the field of microeconometrics, and Fuwa[8] organized the trends of research on this issue in his paper.

20) Of 382 respondents to the questionnaire, 136 were land tenants, of whom 83 tenants had farm fields on lease that require investment for soil dressing. After deleting the missing values from the 83, the remaining 66 farm households were used as sample farmers for this paper.

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