**Optimal Behavior of Rice Farmers in the Imperfectly Competitive**

**Land Lease Market in Japan: With a Focus on Transaction Costs and**

**Uncertain Returns on Land Lease Investment**

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Affiliation: Add superscript number for each affiliation

Corresponding author: Add \* mark after the number for the affiliation

The objective of this study is to judge whether transaction costs and uncertain returns work as restrictions on the number of land lease contracts in Japan. The main outcomes are as follows. First, the study makes it clear theoretically that the perfectly competitive land lease market assumption adopted by the previous papers leads to the overvaluation of the number of land lease contracts when the market competitiveness is imperfect. Second, the study proved empirically that the land lease markets of rice farming are imperfectly competitive according to the significant estimation results of the transaction costs and the option value coefficients.

Summary: Up to 100 words Times New Roman 10 pt

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Key words: farmland lease contract, transaction cost, uncertain return

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**1. Introduction[[1]](#footnote-1)☆**

The improvement of the agricultural structure by expanding farm size has been one of the most important issues in agricultural policy in Japan since the enactment of the Agricultural Basic Law in 1961. In the late 1950s, the number of farm households and the population mainly engaged in farming, which had been considered constant since the Meiji Era, excluding a couple of years after World War II, began to decrease. The reduction of heavy population pressure on rural areas suggested that farm size could be expanded. This is the reason why the agricultural policy at the core of the Agricultural Basic Law tried to improve small-scale farming and small farmland holding. Although almost half a century has passed since the establishment of the Agricultural Basic Law, Japanese agriculture has been weakening. Improvement in the agricultural structure has been stagnant and the agricultural labor force has been shrinking due to increases in the number of part-time farmers and the age of farmers. Structural improvement, as yet to be accomplished, is still longed for as an effective measure to stem the deterioration of Japanese agriculture, but the current situation indicates that there is little time left in which to improve.[[2]](#footnote-2)) The concept of farmland mobility, the keystone of structural improvement, has produced many empirical studies. These studies have mainly tested Kaki’s hypothesis in the context of farmland lease contracts. This research into farmland mobility in the lease market, has not obtained realistic results because of the overevaluation of the number of farmland lease contracts, resulting from the implicit assumption that the farmland lease market was perfectly competitive.

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This paper argues that the assumption that the farmland lease market is perfectly competitive is the cause of the failure of previous research. Two factors omitted by previous studies are focused on. One is transaction costs. Transaction costs include, for example, search cost for the lease in examining land quantity and quality, coordination cost with neighboring farmers and procedural costs in exchanging contracts. The other is uncertainty of future returns. Kaki’s hypothesis sees farmland mobility in the lease market as related to present profitability. However, in the case where future returns are uncertain, it is more likely.　 that a farmer chooses to make no lease contract and to

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Figures and Tables: If a table/figure fits in one column, center it in one column. If a table/figure overlaps two columns, center it in two columns. No text between figures and margins.

Numbers and titles of Figures and Tables: Times New Roman 10 pt. Tables should be titled at the top and figures at the bottom.

Text in figures and tables: Times New Roman 10 pt. Position text so that it does not spill over into the margins.















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**Figure 1. Option value and profits from a farmland lease**

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**2. Analytical Framework**

**1) Farmland lease behavior and real option theory**

Transaction costs and uncertainty are important factors generating an imperfectly competitive market. As mentioned before, Aiue (1998) analyzed the farmland lease market theoretically using a framework explicitly taking account of transaction costs, However, no empirical analyses have estimated the amount of the transaction costs themselves, and no theoretical or empirical studies have analyzed the effect of uncertainty of returns on farmers’ behavior in the lease market. Transaction costs and uncertainty are undoubtedly the main points to consider when analyzing the characteristics and functions of the farmland lease market.

**2) Specification of the option value**

This subsection specifies the option valueand analyzes the effects of transaction costs and uncertainty of returns on. Assuming that the profitfollows a geometric Brownian motion with drift, uncertainty of returns can be represented as follows.

　　　　　　(1)

whereis the drift coefficient,is the standard deviation of the returns, andis the standard Brownian motion.

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**3．Conclusion**

The aim at the core of the Agricultural Basic Law was the improvement of the agricultural structure through the expansion of farm size. This has been one of the most

**Table 1.　The estimation results**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | the former period | | |  | the latter period | | |
|  | Estimate |  | Statistic |  | Estimate |  | Statistic |
|  | 67,822 | \*\* | ( 2.902 ) |  | 34,707 | \* | ( 2.270 ) |
|  | 2.1754 | \*\* | ( 7.690 ) |  | 3.2022 | \*\* | ( 3.653 ) |
|  | -0.4188 |  | ( -0.426 ) |  | -0.2990 |  | ( -0.503 ) |
|  | 36,961 | \*\* | ( 17,321 ) |  | 30,065 | \*\* | ( 10,466 ) |
|  | 37,411 | \*\* | ( 8,710 ) |  | 30,668 | \*\* | ( 7,107 ) |
| Log likelihood: − 1,184 | | | |  | Log likelihood： − 793 | | |

Note: 1) \*\*and \* indicate significant differences from 1% and 5% levels, respectively．

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important issues in agricultural policy until now because farmland mobility is not very high. Although many empirical analyses have been conducted with the aim of contributing to the improvement of the agricultural structure, farmland mobility in the lease market remains lower than predicted. This paper has argued that the assumption of a perfectly competitive market has been the cause of the failure of previous studies. In contrast to the previous studies, which assumed a perfectly competitive market, the objective of this study has been to examine farmers’ behavior in the farmland lease market by using the framework of imperfect competition. This paper analyzed theoretically and empirically the effects of transaction costs and uncertain returns on rice farmers’ behavior through the application of real option theory.

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Acknowledgement: Fund name and no. only.

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References: List all references alphabetized by authors’ last names

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2. ) Noringyogyo Kihon Mondai Chosakai Jimukyoku (Head Office of Investigation Committee on Fundamental Problems in Agriculture, Forestry and Fisheries) (1960) argued that trying to keep the agricultural population constant by supporting agriculture without structural change seemed superficially to be humane and democratic because agricultural structural policy had to destroy the current structure and had to accelerate a polarization of farmers as a result of raising agricultural productivity. See Aiue (1998) for an outline of the agricultural policy at the core of the Agricultural Basic Law, and agricultural structural improvement. [↑](#footnote-ref-2)