

LAND TENURE AND TENANCY CONDITIONS IN RELATION TO RICE PRODUCTION IN THREE VILLAGES IN THE RED RIVER DELTA, VIETNAM

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ABSTRACT

Red River Delta is one of the main rice producing regions in Vietnam. With large variations in natural conditions, the Red River Delta is suitable for development of different types of crops and animals. In recent years, the importance of fisheries, aquaculture and fruit trees have been increasing. With the average farming area per household in Red River Delta being 0.28 ha (2005), land is a limiting factor in generating sufficient income. Most farmers resort to diversifying their farming to high value crops such as vegetables, fruit trees, and livestock for urban markets, or engaging in non-farm activities. The result of this trend is the emergence of tenancy among farmers. This paper attempts to clarify the determination and function of rice land tenancy within the context of the economic structure in three villages in the North of Vietnam. A series of questionnaire surveys were conducted in 2010- 2011 in the villages of Hung Yen (A), Bac Ninh (B), and Hai Phong (C) Provinces which are located in the Red River Delta. The main findings of the research are as follows. There is an increasing area of non-rice production with the appearance of different kinds of tenurial status in different villages. The tenurial status changes with the age of the farmers, indicating the influence of life-cycle on farmers' economic behavior. There is also heavy dependence upon kinship ties in landlord-tenant relations. The production function analysis revealed that the increased use of land, labor, seed and fertilizer could lead to a higher rice production. The average rental under the predominant form of tenancy appeared to be equal to the marginal product of land, but under the contracts established between relatives, the average rental was much lower than the marginal product.

Key words: landlord-tenant relation, fragmentation, rent function, rice farming, production function, marginal product

INTRODUCTION

Land policy is an essential component of economic development measures in all countries and especially in the developing country of Vietnam (Deininger, 2003). Land tenure in Vietnam is complicated because of political, social, economic and natural conditions. Farmers do not own agricultural land, instead land is owned by the state. Based on the Resolution No.10 of Land Law in 1988, former communal farms were first broadly divided into a number of blocks according to land and water conditions, each of which was then equally divided among the commune members with

land use rights (Sally, MacAulay and Pham, 2006). The allocation was intended to provide an egalitarian land distribution, and each household was allocated land according to the number of family members in the household. Therefore, each household came to possess a number of plots under severe fragmentation, resulting in difficulties in farm management. It was estimated that there were 70-100 million plots of land (World Bank, 2005), with around 10% of these plots having an area of only 100 m² or less.

Since the 1993 Land Law was introduced, farmers have had greater freedom to choose which crop to grow. The local governments (provinces) had control over a change of land use, mainly for changes from annual crop to perennial crop lands. However, with high economic and population growth, dietary patterns in the developing countries are rapidly changing, and the demand for food is diversifying in favor of livestock, fruit and vegetables (World Bank, 2005). Land reform has affected land use patterns in districts close to towns and cities in that high value crops are becoming increasingly common in some communes (Cho and Yagi, 2001). There is a clear trend among farmers to reduce rice cultivation and increase the planting of fruit and vegetables (Fujimoto and Vu, 2003). As a result, changes in land use have undoubtedly begun to occur (World Bank, 2005).

Red River Delta (RRD) is one of the two main agricultural producing regions in Vietnam. This delta is smaller but more intensely developed and more densely populated than the Mekong River Delta (MRD). In the RRD, farmers do not sell land, and for those farmers who intend to expand their farms, it is necessary to acquire farmlands by renting-in from other farmers. In fact, land tenancy was occurring both before and after the 1993 Land Law (Do, 2003; Deininger, 2003; World Bank, 2005). Most of the rice production studies were conducted in MRD, where the average size of farms was considerably larger and less fragmented than those in RRD. Economic analysis of land fragmentation has been conducted in RRD (Hung, 2006), but less attention has been paid to the relation between land tenure systems and production (Fujimoto and Kitajima, 2003).

Land tenure situation refers to the ownership and use of land, which is one of the basic production factors in agriculture, and thus represents not only arrangements concerning the land factor in the production process but also an indicator of the socio-economic system of the agricultural village. For further agricultural development, it is necessary to have a better understanding of the present land tenure situation, especially in relation to rice land. This could allow progress to the goal of more efficient use of resources and improved incomes among farmers.

METHODOLOGY

This paper aims to analyze the current situation of land tenure systems, including the pattern of land holding and the existing tenancy contracts of farm respondents. More precisely, this paper attempts to clarify the effect of the land tenure system and tenancy conditions in relation to rental level and rice production in three villages in RRD.

Primary data were obtained from a questionnaire survey of farm households, conducted in 2010. The following considerations were taken into account in the selection of the subject villages: (1) the villages represented different economic conditions in RRD, the main rice growing area, (2) one village should be close to the development center and others less influenced by the center, (3) there were distinctive features in land tenure situation, labor arrangement and practice of farm management. Thus, three study villages were chosen: Village A in Hung Yen province representing a suburban village, Village B in Bac Ninh province as a purely agricultural village, and Village C in Hai Phong province as an agricultural village in a coastal region.

For the purpose of this research, a “farm household” was defined on the basis of three

criteria: household members shared the same fund or budget, household members ate meals together, and household members were related by blood or marriage. The studied households were chosen because they had a typical farm size in the village and the same land and irrigation conditions. The total number of farm households studied accounted for 71, 51, and 42 in villages A, B, and C, respectively.

Econometric and statistical analyses were used in this paper. Descriptive analysis was conducted in order to investigate the differences in land tenure status. To identify quantitatively the factors affecting rental level, a multiple regression analysis was conducted.

In addition to the conventional indicator of land fragmentation (the number of blocks), the Simpson index (SI) of land fragmentation was utilized in this paper. This index is defined as

$(1 - \frac{\sum_i a_i^2}{A^2})$, where a_i is the area of the i^{th} plot, A is the rice land area and $A = \sum a_i$, and thus a value must be between zero and one. A value of zero means that the farm household has only one parcel of rice land, while a value close to one means the household has a number of blocks and so is more fragmented (Scott, 1987).

Cobb-Douglas production function analysis was conducted in order to examine the input-output relationship of production under different conditions in the three villages. This form of production function was preferred because of its advantages: the estimated regression coefficients are equivalent to output elasticity with respect to inputs used in the estimation, indicating the relative importance or the magnitude of contribution of the input variables to the production; and marginal products of the inputs can easily be estimated from the estimated regression coefficients (Heady and Dillon, 1961).

CHARACTERISTICS OF THE STUDY AREAS AND FARMERS STUDIED

The RRD, located in the coastal region of Northern Vietnam, covers 11 provinces. The delta is a flat, triangular region of 1.67 million ha. Some (48%) of the 802,600 ha of the total land area of the Delta is used as agricultural land. It is an agriculturally rich area, where most of the land is devoted to rice cultivation. In recent years, fisheries, aquaculture and fruit trees have been growing in importance. Land is a limiting factor (the average farm land area per household in RRD was 0.28 ha in 2005), so farmers tend to diversify more into high value crops for urban markets or seek non-farm income. Most land in the RRD is fertile, irrigated and suitable for development of different types of crops and animals. Typical cropping systems at the farm level in the RRD are as follows (Fujimoto and Vu, 2003): (1) Two rice crops, (2) One rice crop and two vegetable crops, (3) Two rice crops and one vegetable crop, (4) Four vegetables crops, and (5) All year fruit trees.

The Villages Studied

Hung Yen province is located at the eastern gateway, situated 10km from Hanoi and consisting of 10 districts (Table 1). This province has the typical feature of a delta: flat topography without hills or mountains. There were 54,600 ha of agricultural land, of which 91% were for the cultivation of annual crops, and the rest for perennial crops, fish farming, and other purposes. Of the more than 253,000 households, 62% belonged to the agricultural sector, while 87% of the total population of 1.13 million were engaged in agriculture at the time of study.

Bac Ninh Province, the smallest province of Vietnam, is situated partly on the lowland and hills of RRD, 30 km to the east of the capital city and consists of 7 districts. The total land area was

82,000 ha, of which agricultural land occupied 53.1 %. Agricultural households constituted 48% of the total households with more than 784,000 people working in agriculture. This province has not developed industry as other provinces have but is very famous for its handicraft and cultural heritage.

Hai Phong, the third most populous city in Vietnam, is located in the center of RRD, approximately 120 km from Hanoi. It serves as the primary seaport for the northern region of Vietnam. It is also a popular tourist destination. This province of 14 districts comprises the largest total land area (152,000 ha) of the three study provinces. Although only 33% of total land area was used for agriculture, the number of agricultural households constituted 52% of total households with one million agricultural workers.

Table 1. Basic information of study provinces.

	Hung Yen - A		Bac Ninh- B		Hai Phong - C	
Distance to Hanoi capital (km)	10		30		120	
Total number of districts	10		7		14	
Total land area (thousand ha)	92.3		82.3		152.2	
Agricultural land (thousand ha)	54.6	(59.2)	43.7	(53.1)	51.2	(33.6)
<i>Rice land (thousand ha)</i>	<i>41.3</i>	<i>(75.6)</i>	<i>37.2</i>	<i>(85.1)</i>	<i>41.7</i>	<i>(81.4)</i>
Total households (thousand)	253.4		213.7		269.3	
Agricultural households (thousand)	157.8	(62.3)	103.8	(48.6)	141.9	(52.7)
Total population (thousand people)	1,131		1,026		1,841.7	
Agricultural population (thousand people)	988.8	(87.4)	784.4	(76.4)	1,049.0	(57.0)

Note: Figures in parentheses are percentages.

Source: Vietnam General Statistic Office, 2010

The Farmers Studied

A questionnaire survey was conducted in 2010 in the three villages, covering a total of 164 farmers with a population of 737 people: 71 farmers in Village A, 51 farmers in Village B and 42 farmers in Village C. Table 2 provides a general description of farmers interviewed. The average age of household heads was around 52, but their ages ranged from 30 to 81 years. It was found that most of the farmers had finished secondary school. Some of them, mostly young farmers, had been educated up to high school.

Most of the household heads worked on their individual farms as the main occupation, while some worked as members of farming cooperatives and workers. The average family size was 4.3 persons, and the number of family members who assisted in farming activities was 2.5 persons. Through the investigation, it was found that, in the farm households near the capital, Village A, young people soon separated from their parents after marriage to become individual families, mostly engaged in non-agricultural sectors for higher income. In the other villages, however, they still lived together and formed a larger farm household.

Table 2. General description of households studied in the three study villages.

Items	A	B	C	Overall
Total population (people)	284	246	207	737
No. of households	71	51	42	164
Average age of the heads (years)	52.7	51.4	49.8	51.6
Education				
Elementary school	13	7	5	25
High school	15	13	7	35
Main occupation				
Farmer	55	44	34	133
Cooperative members	6	5	7	18
Workers	3	2	1	6
Handicraft	1	0	0	1
Other	6	0	0	6
Average family size (persons)				
Total members	4.0	4.8	4.3	4.3
Agricultural workers	2.2	2.6	3.0	2.5

Source: Our survey 2010-2011.

LAND TENURE SITUATION

There were different systems of land tenure, but in each area one system was typically common. In this section, characteristics of land tenure situation in the study villages are clarified. Because of the fact that land is owned by the state and farmers were allocated with land use rights, the term “owned land” in this paper refers to the land allocated to the farmers.

Land Resources

Under the 1993 Land Law, farmers were allocated with land for long-term and stable use and granted five rights of land use: the rights of transfer, exchange, lease, inheritance and mortgage. Thus, land operated by studied farmers was acquired through allocation, inheritance or tenancy. Most owned land was acquired by allocation, while young farmers inherited from their parents. The three study villages were located in the main rice growing area, and therefore land holdings were largely limited to rice land. **Table 3** shows the type and area of land owned and operated at the time of study. The unit of area is the sao, which is a traditional measure of area in Vietnam; one sao is equivalent to 360m². While rice land area was predominant, farmers also owned other kinds of land as well. In addition to upland, which was an important land resource in all three villages, fruit land area was increasing in Village A. The farmers who operated rice land accounted for 71%, 92% and 100% in Villages A, B, and C respectively. It is important to note that the operated area has increased through tenancy contracts by about 4% in Village C, 12% in Village B and as much as 27% in Village A, showing the demand for expanding cultivated area. There was a significant expansion of all kinds of land in Villages A and B for agricultural diversification in response to the expanding market of Hanoi, but not so much in Village C.

Table 3. Land resources in the three study villages, 2010.

	Owned			Operated			
	No. of HH	Total area (sao)	%	No. of HH	%	Total area (sao)	%
A							
Rice land	51	215.15	56.2	50	71.4	273.15	52.2
Upland	47	139.09	36.4	46	65.7	212.49	40.6
Fruit land	14	28.30	7.4	15	21.4	38.08	7.3
Total	71	382.54	100	70		523.72	100
B							
Rice land	49	139.25	64.8	47	92.2	162.00	66.0
Upland	40	75.70	35.2	38	74.5	83.35	34.0
Total	51	214.95	100	51		245.35	100
C							
Rice land	42	168.25	72.9	42	100	178.60	74.4
Upland	36	62.65	27.1	37	88.1	61.35	25.6
Total	42	230.90	100	42		239.95	100
Overall							
Rice land	142	522.65	63.1	139	85.3	613.75	60.8
Upland	123	277.44	33.5	121	74.2	357.19	35.4
Fruit land	14	28.30	3.4	15	9.2	38.08	3.8
Total	164	828.39	100	163		1,009.02	100

Source: Our survey 2010-2011.

Tenurial Status

The details of operated land area by tenurial status are shown in Table 4. Owner-tenant farmers appeared generally to operate the largest area of land, averaging 8.2 sao per farm. In Village A, they operated 9.6 sao per farm household and in Villages B and C, 6.3 and 7.5 sao, respectively.

Tenurial status seemed to change in relation to the age of farmers, indicating the life-cycle nature of farmers' economic behavior. In all three villages, owner farmers, who acquired land through inheritance from their parents, were the youngest. As they accumulated farming experience and capital, they started to rent-in land and became owner-tenant farmers with a larger cultivated area. As they grew older, their children also grew up and as a result of smaller family need, they rented-out their land to their children and became landlord-owner-tenant farmers. In some cases, because of the fragmentation of land, when farmers had good relations with others, they adjusted the location of operated land by rent-in and rent-out contracts at the same time to reduce labor cost and become landlord-owner-tenant farmers. As farmers grew even older, they stopped renting-in and increasingly rented-out their land, with their cultivated area becoming smaller, to become landlord-owner farmers. Eventually, farmers retired as pure landlords by renting out all of their owned land.

It is interesting to note that this life-cycle in RRD appeared to be different from other Southeast Asia countries. For instance, in Thailand and Malaysia, farmers began their lives as tenant farmers, renting in some land from such close relatives as parents. As they grew older, they were likely to receive some land through inheritance from their parents and became owner-tenant farmers. Eventually they stopped renting in land as they came to own sufficient land for the family need, thus

becoming owner farmers. Meantime, as their children grew older and married, they started helping their children by renting out part of their land holding and so became landlord-owner-farmers. They then retired from farming to become landlords, letting their children cultivate all the land (Fujimoto, 1983; Matsuda and Fujimoto, 1998).

Thus, it is clear that in RRD farmers started their life as owner farmers, while in other countries, they started as tenant farmers and tenancy commonly appeared to function as a means of adjusting production capacity to meet the family needs.

Table 4. Number of households and land area according to tenurial status in the three study villages.

	No.	Total area owned (sao)	%	Average area operated (sao)	Ave. age of the head (years)
A					
Landlord	1	4.00	1.0	0	76.0
Landlord-owner farmers	10	63.93	16.7	4.13	63.3
Landlord-owner-tenants	9	50.32	13.2	8.22	57.7
Owner farmers	20	110.97	29.0	5.55	44.3
Owner-tenants	31	153.32	40.1	9.60	52.5
Sub total	71	382.54	100	7.38	52.7
B					
Landlord-owner farmers	12	58.40	25.7	2.93	60.2
Landlord-owner-tenants	7	47.15	26.1	6.72	57.4
Owner farmers	13	43.25	20.0	3.33	42.8
Owner-tenants	19	66.15	28.1	6.31	49.8
Sub total	51	214.95	100	4.21	51.4
C					
Landlord-owner farmers	10	63.05	27.3	4.96	60.0
Landlord-owner-tenants	2	11.00	4.8	5.35	56.0
Owner farmers	19	97.00	42.0	5.11	43.7
Owner-tenants	11	59.85	25.9	7.51	49.8
Sub total	42	230.9	100	5.71	49.8
Overall					
Landlord	1	4.00	0.5	0	76.0
Landlord-owner farmers	32	185.38	22.4	3.94	61.1
Landlord-owner-tenants	18	108.47	13.1	7.32	57.4
Owner farmers	52	251.22	30.3	4.83	43.7
Owner-tenants	61	279.32	33.7	8.20	51.2
Total	164	828.39	100.0	5.97	51.6

Source: Our survey 2010-2011.

Two of the five stages in the farmers' life-cycle (landlord-owner-tenants and owner-tenants) corresponded to 50% of all farmers, indicating the importance of tenancy relations in analyzing land tenure systems in RRD in recent years. It was seen that a large area of rice land was rented-out but an even larger area was rented-in in all of the three villages. In other words, tenancy was a common phenomenon in these areas, especially in Village A. This probably reflected the increasingly stronger demand for farm land expansion.

Fragmentation

Fragmentation, the division of a farm into separate blocks of land, is a characteristic of agriculture throughout the world. It is not unique to any one region, culture or farming system and it is estimated that 80% of the world's farmland is fragmented (Scott, 1987). In Vietnam, based on the Resolution No.10 of the Land Law in 1988, land was distributed on the principle of fairness, taking into account soil and socio-demographic characteristics of the region. In this way, true equality was pursued in land distribution with respect not only to the extent of land area but also the quality of land. Therefore, each household was allocated with a number of plots of different locations and extent under severe fragmentation. There are advantages and disadvantages to land fragmentation. By cultivating plots in different geographical areas, variation in output can be less because the risks caused by drought, flood and diseases can also be spread (Blarel, 1992). However, fragmentation causes difficulties in the application of new technology, mechanization, irrigation and access to the fields. Labor requirement is certainly greater under severe fragmentation. Therefore, land fragmentation may result in lower crop yield and reduce the positive impact of expanded farm size on productivity (Wan and Cheng, 2001).

With more than 70% of farm households cultivating rice, the detailed analysis of land tenure is focused on rice land in this paper. Two main measures of fragmentation were used: the number of blocks per farm household, and Simpson's diversification index. Table 5 shows the degree of fragmentation by farm size in study villages. Land fragmentation varied between villages. Village A had the largest average rice land area with 5.47 sao, and an average of 2.7 blocks per farm household. In Villages B and C, the average number of blocks of rice land per farm household was larger (2.9) but the average rice land area was smaller, 3.45 sao and 4.25 sao respectively. This result showed that the average area of each block in Village A was larger than in Villages B and C.

When the degree of fragmentation was measured by the number of blocks of land per farm household, Village A's farms were the least fragmented and Villages B and C were at the same level. When the degree of fragmentation was measured by Simpson's index, it was 0.48 for farms in Village A, 0.55 for Village B and 0.58 for Village C on the average, meaning that rice land in Village C was most fragmented, and Village A the least fragmented. For each village, farmers with a larger rice land area had more fragmented holdings, indicating that increase in cultivated area was accompanied by an increase in the number of blocks of land. However, for the same farm size group, rice land in Village A was least and Village C most fragmented, because of the prevailing land tenancy contracts in the villages.

Tenancy Contracts and Landlord-Tenant Relations

The Land Law of 1993 gave security of tenure over allocated land, with land use rights granted for 20 years for annual crop and 50 years for perennial crop land. Land ceilings were imposed at 2-3ha for annual crop land and 10 ha for perennial crop land in communes in the delta area. Land use rights can be transferred, exchanged, leased, inherited, and mortgaged (Sally, MacAulay and Pham, 2006). Following this law, land transfers are occurring, but many are in fact illegal. The main reason for these illegal transactions is the high cost associated with registering land transfers. Most households were issued with only one land use certificate for all of their allocated plots. If a household wishes to dispose of or exchange any one of their plots, they must surrender their land certificate and have it reissued. There are high transaction costs involved in doing this, so that land use rights transactions are normally carried out with no official registration.

Among the total of 71, 51 and 42 farm households in Villages A, B, and C, there were 53, 54 and 26 rice land contracts, respectively. The farm households studied reported fewer rent-out than rent-in contracts and they showed varying trends over time. Table 6 shows the number, form and

rental level of tenancy contracts by landlord-tenant relation. There were four main forms of tenancy contracts: rent-free, fixed rent in cash, fixed rent in kind and fixed rent in cash equivalent. First, rent-free contract was practiced only in two cases in Villages A and B. This form of tenancy was common among very close relatives, usually between parents and their children. It became clear that retired parents allowed their children, who also have their own land, to work on their land without payment in order to maintain the land use right. Under the current policy, if farmers cannot cultivate their land, their land would be collected and distributed to other farmers.

Table 5. Rice land fragmentation indices by farm size in the three study villages.

Farm size (sao)	No. of HH	%	Ave.area per HH (sao)	Ave. No. of block	Ave. SI
A					
Under 3	10	20.0	2.30	2.1	0.33
3- under 6	27	54.0	4.48	2.5	0.46
6- under 9	6	12.0	7.07	3.3	0.56
More than 9	7	14.0	12.41	3.9	0.65
Sub Total	50	100	5.47	2.7	0.48
B					
Under 3	24	51.1	1.92	2.4	0.47
3- under 6	17	36.2	3.80	3.2	0.61
6- under 9	4	8.5	7.73	3.8	0.68
More than 9	2	4.3	10.15	4.0	0.68
Sub Total	47	100	3.45	2.9	0.55
C					
Under 3	14	33.3	2.34	2.1	0.46
3- under 6	21	50.0	4.19	3.0	0.61
6- under 9	6	14.3	8.02	4.3	0.74
More than 9	1	2.4	9.85	5.0	0.71
Sub Total	42	100	4.25	2.9	0.58
Overall					
Under 3	48	34.5	2.12	2.23	0.44
3- under 6	65	46.8	4.21	2.85	0.55
6- under 9	16	11.5	7.59	3.81	0.65
More than 9	10	7.2	11.71	4.00	0.66
Total	139	100	4.42	2.83	0.53

Source: Our survey 2010-2011.

Second, fixed rent in cash refers to a contract where the rental was paid in cash at fixed level. Rent was generally paid after harvest and it was a common practice for tenants to bring the cash rent to the landlord's house, rather than landlords coming to collect it from their tenants. This tenancy form constituted 20% of all contracts in Village A, but was seldom practiced in other villages. The average rental was around 290,000 VND per sao per year.

Third, fixed rent in kind was a contract where a fixed amount of unhusked rice (paddy) was paid as rent after harvesting. This form of contract was usually adopted according to the request of the landlords for their own consumption of rice at home. Thus, it constituted 20%, 35% and 54% of the rice land tenancy contracts in Villages A, B and C respectively. The amount of rental did not greatly

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differ among the three villages, being around 62 kg paddy per sao per year for rice land.

Fourth, the common form of tenancy contract was fixed rent in cash equivalent. Rent was paid in cash, equivalent to the specified amount of paddy rent as sold after harvesting. The calculated price was the on-going price of paddy in the province or region, and it was 4,300 VND per kg at the end of 2010. Since the average rental was around 96 kg of paddy per sao per year, it amounted to about 414,000 VND.

It is noted that the overall average rental was 348,000 VND per sao per year for various forms of tenancy contract. However, for the predominant form of tenancy contract (fixed rent in cash equivalent), a clear difference existed in the average rental for two types of landlord-tenant relations, relatives and non-relatives. The overall rental was only 314,200 VND per sao per year for those contracts established between relatives, while it was 451,300 VND between non-relatives. This difference seemed to support the argument that the landlords were willing to give a lower rental to their relatives.

As mentioned earlier, larger farms tended to be more fragmented but fragmentation level could be decreased through tenancy. The reasons for landlord and tenant to rent-out and rent-in, shown in Tables 7 and 8, could explain how fragmentation may be reduced through tenancy. There was a total of 91 rent-in and 42 rent-out contracts in the three villages. Rent-in and rent-out contracts refer to those lands rented in and rented out respectively by farmers under study. While “expanding block size” was the main reason for renting in land (34%), as much as 23% of rent-out transactions were caused by “too small” plots of cultivated land. This change in the increased size of block or the decreased number of blocks certainly lowered the magnitude of Simpson’s index of land fragmentation. The most frequently mentioned reason for renting out was “land located far away” (32%), while 19% of rent-in contracts were chosen for being “land located near.”

The land allocation policy has caused the fragmentation of farms cultivated by farmers. Recently, in order to reduce fragmentation and cost of production, renting out small and far plots and renting in nearby plots to expand cultivated area has emerged as an important trend. Because of the frequency of kinship ties involved in tenancy relations, it is not at all surprising to see the reason; “landlord (usually a relative) does not cultivate” for renting in (37%) and to “help relatives” (to expand their block size and cultivation area) for renting out (30%).

In short, fixed-rent tenancy assumed risks to be borne solely by the tenant, who paid a fixed amount of rent, regardless of the quantity of harvest; but the tenants could make their own decisions and reduce risks through irrigation facilities, better seeds, improved pest control and better farming techniques. Thus, fixed-rent tenancy, especially fixed-rent in cash equivalent, was found to be common and becoming more popular.

Table 6. Tenancy forms and rental rate by landlord-tenant relation in the three study villages.

	Relatives		Ave. Rental /sao/year	Non relatives		Ave. Rental /sao/year	Total		Ave. Rental /sao/year	Cash equivalent (1,000 VND)
	No.	%		No.	%		No.	%		
A										
Rent free	1	2.7		0	0		1	1.9	0	
Fixed rent-in cash (1,000 VND)	9	24.3	253.3	2	12.5	450.0	11	20.8	289.1	
Fixed rent-in kind (kg paddy)	11	29.7	69.1	0	0	0	11	20.8	69.1	297.1
Fixed rent-in cash equivalent (kg paddy)	16	43.2	89.4	14	87.5	106.4	30	56.6	97.3	418.5
Sub total	37	100		16	100		53	100		358.5
%	66.0			34.0			100			
B										
Rent free	1	2.6		0	0		1	1.9	0	
Fixed rent-in cash (1,000 VND)	1	2.6	270.0	0	0	0	1	1.9	270.0	
Fixed rent-in kind (kg paddy)	19	48.7	58.7	0	0	0	19	35.2	61.3	263.6
Fixed rent-in cash equivalent (kg paddy)	18	46.2	88.6	15	100	102.1	33	61.1	95.8	411.9
Sub total	39	100		15	100		54	100		349.5*
%	66.7			33.3			100			
C										
Fixed rent-in cash (1,000 VND)	1	5.0	280.0	0	0	0	1	3.8	280.0	
Fixed rent-in kind (kg paddy)	14	70.0	60.0	0	0	0	14	53.8	60.7	261.1
Fixed rent-in cash equivalent (kg paddy)	5	25.0	86.0	6	100	111.7	11	42.3	94.5	406.5
Sub total	20	100		6	100		26			323.3*
%	61.5			38.5			100			
Overall										
Rent free	2	2.1		0	0		2	1.5	0	
Fixed rent-in cash (1,000 VND)	11	11.5	257.2	2	5.4	450.0	13	9.8	286.9	
Fixed rent-in kind (kg paddy)	44	45.8	61.7	0	0.0	0	44	33.1	63.1	271.2
Fixed rent-in cash equivalent (kg paddy)	39	40.6	88.6	35	94.6	105.5	74	55.6	96.2	413.8
Total	96	100	314.2*	37	100	451.3*	133	100		348.0*
%	65.4			34.6			100			

Source: Our survey 2010-2011.

Note: * Overall average rental in cash equivalent

Table 7. Reasons for renting-in rice land given by tenants in the three study villages.

	A	B	C	Total	%
Expand block size	12	16	3	31	(34.1)
Landlord does not cultivate	12	13	9	34	(37.4)
Land located near	8	8	1	17	(18.7)
Increasing income	8	5	4	17	(18.7)
Having time	4	3	2	9	(9.9)
No. of contract	39	36	16	91	

(Multiple answers)

Source: Our survey 2010-2011.

Table 8. Reasons for renting-out rice land given by landlords in the three study villages.

	A	B	C	Total	%
Land located far away	7	4	4	15	(31.9)
Help relatives	3	6	5	14	(29.8)
Too small	3	6	2	11	(23.4)
Excess over family need	3	4	1	8	(17.0)
Old age/ Retired	2	3	0	5	(10.6)
No. of contract	14	18	10	42	

(Multiple answers)

Source: Our survey 2010-2011.

ECONOMIC ANALYSIS RELATED TO RICE PRODUCTION

There were a number of economic studies dealing with rice farming in Vietnam but most of them were concerned with the MRD. Very little attention has been given to the effects of land tenure systems on rice production. This section discusses the results of the economic analysis of land tenure systems in relation to rice production in the three villages studied in the RRD.

Rent Function

With the expansion of the tenancy market, one important issue is the determination of rental levels. Analysis of rental determination will provide another view of the nature of landlord-tenant relations among the farmers. Excluding rent-free contracts, there were 89 rent-in and 42 rent-out contracts for rice land, and rent functions were estimated for both groups of tenancy contracts.

The model used for the estimation of rent function is as follow:

$$R = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5$$

Where,

R is the average rent per sao per year for rice land tenancy contract, expressed in thousand VND.

X₁ refers to the area of rented land (sao),

X₂ refers to physical quantity of rice production value (kg/sao/year),

X₃ refers to total years so far rented (years),

X_4 is a dummy variable for the existence of kinship ties in landlord-tenant relations; 0 for relatives (including distant relatives) and 1 for non-relatives, and
 X_5 is a dummy variable of tenant residence, 0 for tenant living inside the village and 1 for outside the village

With generally small farm size, there is a strong demand for the expansion of farm land area (X_1) through tenancy. In order to obtain a larger land area, the tenants probably accepted a higher rental level. Physical quantity of rice production (X_2) is an economic variable in determining rental level, and it can be expected that the higher the level of production, the higher will be the rental level.

Total years so far rented (X_3) is considered as a factor in rental determination. The rental is paid either per season or per year, and the rental level can be raised easily when the contract is renewed. Therefore, the longer the years rented, the cheaper would be the rental level.

Regarding social considerations in rental determination, it is possible that kinship (X_4) based tenants may be in a better position than those tenants renting in from non-relatives. The landlord who was a tenant's relative was expected to make the rental cheaper than for non-relatives. Beside the kinship ties in landlord-tenant relations, tenant residence (X_5) was also important in deciding the rental level. Because of close social relations of farmers in a village, tenants living in the same village with their landlords may have expected a lower rental level than those contracts with landlords living in other villages.

Results of the estimation are presented in Table 9. The coefficient of determination (R^2) was 65% and 69% for rent-in and rent-out contracts respectively, indicating that two-thirds of rental variations were explained by the variables included in the model. The regression coefficient for the area of rented-out land (X_1) is statistically significant at the 5% probability level. This means that the larger the land area rented out per contract, the higher the rental level per sao, as expected. The results suggest that if the land area under contract was larger by one sao, the rental would increase by roughly 28,535 VND per sao, with other things being constant. It should be clearly noted that this variable is statistically significant only for rent-out function. It seemed that the landlord tended to rent-out a larger area with higher rental level, while most of the tenants rented-in land to expand cultivated area and were prepared to pay a high rent even for a small piece of land.

The regression coefficient for the physical quantity of rice production (X_2) is statistically significant at the 1% probability level and has the expected sign. If the output per one sao of land under contract increased by 1,000 VND per year, the rental level would increase by 770 VND per sao per year.

The regression coefficient for the total years rented (X_3) is also statistically significant for both rent-in and rent-out functions. The longer the period rented, the lower the rental level per sao. The contract period ranged from 2 to 20 years with an average of 5 years. Recently, landlords wanted to rent-out on a short contract for the purpose of easily changing the rental level under the market price. Within the contract period, the rental could not be raised, therefore the longer period meant the older contract with a lower rental level. This factor showed a contrasting result in the determination of rental for fruit land (Phan and Fujimoto, 2010). In the case of fruit land, longer periods of rental contract commanded higher levels of rental per sao, because fruit production needed a certain period of cultivation to attain economic efficiency. So the tenants wanted to rent-in land on a long-term contract and were willing to accede to a higher rental level for their fruit production.

The regression coefficient for kinship ties is also statistically significant at the 1% level for rent-in and rent-out functions. Kinship appeared to lower the level of rental. The magnitude of the

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regression coefficient suggests that the existence of kinship ties reduced the rental by 36,550 VND and 112,460 VND for rent-in and rent-out respectively, from the mean rental of 346,600 VND per sao on the average.

The regression coefficient for the place of tenant residence is statistically significant at the 5% level for the rent-in as well as rent-out functions. Tenants living outside the village seemed to have a higher rental level compared with tenants living inside the village as expected, because farmers in the same village usually have close relations.

The result of this analysis was quite consistent with the situation described in the preceding section. As tenancy relations were flexible, the process of rental determination was clearly affected by social factors such as kinship ties and place of residence.

Table 9. Rent function estimates for rice land tenancy in the three study villages.

	Rent-in		Rent-out	
	Reg. coeff.	t value	Reg. coeff.	t value
Constant	141.76	1.35	311.41	7.87
Area of rented land (sao)	8.45	1.07	28.53 *	1.85
Production (1,000 VND/sao)	0.77 ***	2.85		
Total years rented (years)	-18.13 ***	-7.99	-9.13 **	-2.06
Kinship (dummy)	36.55 ***	2.7	112.46 ***	4.99
Tenant residence (dummy)	30.03 **	2.21	39.34 **	2.02
N	89		42	
R square	0.65		0.69	
F value	56.60		58.80	

* Significant at the 10% probability level.

** Significant at the 5% probability level.

***Significant at the 1% probability level.

Source: Our survey 2010-2011.

Production Function

In view of different land and water conditions, it is possible for different villages to have different input-output relationships. Therefore, Cobb-Douglas production function is used to examine the factors of production which affect the level of rice production in each village. Data obtained from farmers were dealt with on a per-season basis. Since the farmers planted two rice crops in a year (spring rice and summer rice), the number of the sample was actually doubled. The form of the function is written as follows:

$$Y = aX_1^{b1} X_2^{b2} X_3^{b3} X_4^{b4} X_5^{b5} X_6^{b6}$$

Where,

Y refers to gross rice production in each season per farm as measured in kg.

X₁: the area of rice land planted to rice (sao) in each season. This refers to cultivated area including owned and rented land under operation. The relationship of land area and rice production is expected to be positive in that the increase in operated land will increase rice production.

X₂: Total labor input (man-days), including not only family but also hired labor. It is expected that the increased use of labor will increase rice production.

X₃: Total value of seed, measured in 1,000 VND. There were different kinds of rice seed and the better

quality seed was generally more expensive. Thus, it is expected that production will increase with the higher value of seeds.

X₄: The amount of pesticides, including herbicide, measured in 1,000 VND. Although modern varieties were improved to become pest and disease resistant, farmers generally applied pesticide and herbicide in order to overcome pest and disease attack. Through the better cure of pest and disease problems, rice production may increase.

X₅: Total amount of chemical fertilizer (NPK) expressed in kg.

X₆: Education level of farmer, 1 for primary school, 2 for secondary school and 3 for high school. It is hoped that this variable will correspond to basic training which is essential in good and efficient farm management. A positive sign is expected for the regression coefficient of education.

Table 10 shows the estimates of Cobb-Douglas production functions in rice farming of different villages in 2010. The coefficients of determination (R^2) indicate that the model explained more than 92% of the total variations of rice production among the farmers of different villages.

Most of the six independent variables had significant coefficients in all villages. The magnitude of the regression coefficient for total labor (X_2) is the largest for all villages and it is significant at the 1 to 5% level. The increased use of labor by 10% will probably result in increased output by 5.6 to 7.1%. In Village A, the regression coefficient for land area (X_1) is statically significant, indicating that a 10% increase in area would result in a higher production by 3.1%. However, it is important to note that the land area was not a significant factor in Villages B and C, where severe fragmentation was observed. It is probable that positive effects of larger planted area were offset by the increased fragmentation, resulting in insignificant contribution of land area to increased rice production.

The value of seed (X_3) was also an important variable, significant at the 1% level for all farmers. Production could be increased by around 1% by investing 10% more in better seeds. Increase in fertilizer (X_5) by 10% could also increase production by 0.6 to 1.3%. But in the case of pesticide (X_4), the regression coefficient has a negative sign, indicating that a larger use of pesticide would not result in a higher production. It can be explained by the fact that the farmers used pesticide only when pest and disease actually damaged the crop, and they would tend to apply more pesticide if they observed a high incidence of pests and diseases. The incidence of pest and diseases was correlated with low productivity. Thus, the more pesticide used, the more disease probably appeared and production decreased. The magnitude of the contribution of education (X_6) for all farmers is high, pointing to the importance of management skill.

In short, the production function analysis revealed that both labor input and land area were important determinants of rice income. The contribution of other factors appeared to be rather small. With the limited land area available and rapid increase in population in Vietnam, improving rice production clearly depended on agricultural labor.

Based on the production function estimates, the marginal products of some production factors can be estimated and the efficiency of resource use examined. The marginal value product (MVP) of land was estimated to be 218,260 VND per sao per season, or 436,520 VND per sao per year. The marginal factor cost (MFC) of land, the overall average rental per sao per year, was 348,000 VND. However, under the contract of fixed rent in cash equivalent, which was the predominant form in the study villages, the average rental was as high as 413,800 VND. Especially, it was 451,300 VND for the contracts established between non-relatives, and the MVP/MFC ratio is 0.97, indicating that the average rental was almost equal to the marginal product of land. However, in the case of the contracts established between relatives, the average rental was 314,200 VND, making the MVP/MFC ratio to be 1.39. This indicates that the rental level was somehow kept lower than the marginal product of land under the contracts between non-relatives.

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Table 10. Rice production function estimates in the three study villages.

	A		B		C		Over all	
	Reg. coeff.	t value	Reg. coeff.	t value	Reg. coeff.	t value	Reg. coeff.	t value
Constant	3.98	10.64	3.63	7.19	3.38	5.79	3.78	14.32
Area (sao)	0.31 *	1.66	0.21	0.79	0.05	0.15	0.24 *	1.76
Labor (man days)	0.56 ***	2.94	0.57 **	2.11	0.71 **	2.14	0.59 ***	4.17
Seed (1,000 VND)	0.12 ***	4.04	0.13 ***	2.70	0.14 ***	3.33	0.09 ***	4.80
Pesticide (1,000 VND)	-0.08 ***	-5.20	-0.04 *	-1.97	-0.04 **	-2.21	-0.05 ***	-5.42
Fertilizer (kg)	0.06 **	2.18	0.13 ***	3.13	0.12 ***	2.92	0.11 ***	5.14
Education (level)	0.14 ***	7.25	0.03	0.90	0.07 **	2.21	0.09 ***	6.58
N	100		94		84		278	
Sum of coefficients	1.11		1.01		1.04		1.08	
R square	0.97		0.95		0.92		0.97	
F value	1,074.60		912.57		646.23		2,571.58	

* Significant at the 10% probability level.

** Significant at the 5% probability level.

***Significant at the 1% probability level.

Source: Our survey 2010-2011.

CONCLUSION

Based on the detailed data collected from a series of questionnaire surveys in three rice growing villages (A, B, and C) in the Red River Delta, this paper presented an analysis of land tenure system and tenancy conditions in relation to rental level and rice production. It became clear that farm size varied greatly among the households in the same village and also in different villages, due to the emergence of tenancy contracts. Expanded farm size was generally accompanied by a higher degree of fragmentation, but in some cases tenancy eased the level of fragmentation. Village A, located near Hanoi, had the largest average operated area, with the largest number of land transactions and the highest rental level. There was a general trend of increasing non-rice cultivation in all the three villages.

Five kinds of land tenure status were observed: landlord, landlord-owner farmer, landlord-owner-tenant farmer, owner farmer and owner-tenant farmer. The tenurial status changed with the age of farmers, supporting the life-cycle of farmers' economic behavior. The great majority of tenancy contracts were also found to be between relatives. There existed a considerable variation in the actual rental levels among fixed-rent tenancy agreements even in the same village because the rental variation seemed to reflect mutual aid between kin-based relatives in landlord-tenant relations. The estimation of rent functions confirmed social considerations in the process of rental determination. The Cobb-Douglas production function analysis revealed that land, labor, seed, fertilizer, and education are important for increasing rice production. However, pesticide appeared to be overused.

It is also important that the average rental level of rice land appeared to be equal to the marginal product of land in rice farming, pointing to the economic rationality in the tenancy market. However, the rental level appeared to be much lower than the marginal product of land under those contracts established between relatives, confirming the influence of social considerations in tenancy conditions. Therefore, it can be concluded that the current land tenure systems and tenancy conditions clearly reflected social considerations of the farmers. It is economically rational to enlarge farm size through tenancy contracts, as farm size contributes positively to the improvement in farm efficiency and income. Land policy should aim to ease the level of farm fragmentation, while promoting farm size expansion.

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