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Imperfect Markets and Emerging Landholding Inequality in Cambodia

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Using detailed household data from two Cambodian villages, this paper explores the cause of increasing landholding inequality in Cambodia. Through the investigation of data on land and credit markets as well are econometric analysis of land purchase and sales, this paper elucidates reasons why land as sold by smaller landholders to larger landholders. First, because the price of land is higher than the net present value of agricultural profit based on interest rate as the discount rate, buying land with loans is unprofitable. Therefore, larger landholders, who are supposed to have a larger amount of their own funds, were the major land buyers. Second, because the interest rate is higher than the rate of return from land, coping with shocks by borrowing money is more costly than selling land. Consequently, small landholders, who are supposed to lack savings to draw on, are more likely than large landholders to sell land to cope with shocks. The high land price and high interest rate are caused by credit market imperfection, which is manifested as the gap between interest rate and the opportunity cost of capital or the rate of return from land.

Key words : land distribution, land market, credit market, market imperfection, Cambodia.

1. Introduction

Overturning the Pol Pot regime in 1979, the so-called Hen Samrin government of Cambodia tried collective farming with groups called *krom samaki* as the farming unit. However, after several years, this collective farming system was dissolved and farmlands were redistributed among rural households. Through this land reform, each household received land roughly according to the number of household members (Amakawa [1]). Therefore, land distribution in the 1980s was presumed to be relatively equal. Notwithstanding, nation-wide household surveys in the late 1990s show that land distribution in Cambodia is not equal any longer (Chan and Acharya [7] ; Chan, Tep and Acharya [6]).[1)] The number of landless households has been increasing (Biddulph, [2]).

The increase in landholding inequality may worsen income distribution in Cambodia as its economy still depends on agriculture, though we lack data to prove it. In addition, those who lost land may get poorer. Therefore, it is important to study the cause of the increasing landholding inequality in Cambodia and find ways to mitigate it. But, no study has explored the cause of the increasing landholding inequality in Cambodia.

It is presumed that the landholding inequality in Cambodia has increased through land market because a large part of landless households lost their land by sales (Biddulph [2]). However, no study has confirmed that land purchase and sales have increased landholding inequality in Cambodia. Land distribution gets worsened through land market when larger landholders increase their land by purchasing more land than others, and when some other households, especially smaller landholders, lose land by sales. Therefore, we have to answer two questions : why larger landholders could buy more land ; and why some others sold land. However, previous

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studies on Cambodian land issue have not addressed these questions sufficiently. Though some studies have revealed that paying medical expenses is the chief cause of land sales in Cambodia (Biddulph [2] ; Chan and Acharya, [7]), these studies do not inquire the economic reason why they had to sell land to treat illness.

Filling these gaps, this paper is the first attempt to explore the cause of increasing landholding inequality in Cambodia. Using primary data from two Cambodian villages, this paper examines whether landholding inequality has increased through the land market in these two villages, and explores the reason why larger landholders could buy more land and the reason why some others sold land.

Previous studies indicate that imperfection in the credit market is related to these questions. Binswanger and Elgin [3] argue that because larger landholders have better access to credit (which results from market imperfection), and because the credit access advantages are capitalized into land values, the land price tends to be higher than the net present value of agricultural profit (NPVA, hereafter). The high land price makes buying land with loans difficult ; as a result, households with larger surplus funds, such as larger landholders, could buy more land. Carter and Mesbah [6] argue that differing access to credit of large and small farms creates a productivity gap between them, which induces smaller farms to sell their land to larger farms. With regard to the cause of land sales, previous studies suggest that the lack of insurance and unfavorable borrowing conditions force households to sell land in order to cope with adverse shocks (Cain [5] ; Carter and Mesbah [6] ; and Binswanger, Deininger and Feder [4]).[2] Credit market imperfection also seems related to the land sales because that may cause the unfavorable loan conditions.

Following these studies, this paper first examines how the landholding inequality has increased in surveyed villages, and finds that land distribution has worsened as larger landholders bought more land and some others lost land by selling land to cope with adverse shocks. This paper then proposes a hypothesis that larger landholders bought more land because land price is higher than NPVA calculated with interest rate as the discount rate, and suspects the credit market imperfection as the cause of the high land price. With regard to land sales, this paper proposes a hypothesis that a high interest rate induces land sales for coping with shocks. These hypotheses are tested by econometric analysis of the determinants of land purchase and sales.

One of the noteworthy findings of this paper is that a high interest rate may increase landholding inequality by affecting both land purchase and sales. A high interest rate makes land price higher than NPVA calculated with interest rate as the discount rate, which would make larger landholders major land buyers as mentioned above. This contrasts with previous studies such as Binswanger and Elgin [3] and Binswanger, Deininger, and Feder [4], which attribute the high land price only to non-agricultural benefits of owning land. A high interest rate also makes coping with adverse shocks by borrowing money difficult and thus induces land sales to cope with shocks. These factors suggest that interventions in the credit market can be very effective in mitigating the increase in landholding inequality.

All the data used in this paper were collected by the author through fieldwork from 2002 to 2003. Surveyed villages, denoted S and T, were selected because these two villages have contrasting features : S villagers rely more on farming for their income, while T villagers depend more on off-farm work. As shown later, these contrasting features cause a difference in the inequality in landholding between the two villages, which is consistent with the hypothesis proposed by this paper.

This paper is organized as follows. After outlining the surveyed villages, Section 2 confirms that the landholding inequality has increased mainly through land markets. Section 3 presents hypotheses. In Sections 4 and 5, econometric analyses of land purchase and sales are conducted to test these hypotheses. The final section concludes this paper.

2. Land Distribution in Surveyed Villages

1) An outline of surveyed villages

Surveyed villages, S and T, belong to Takeo province, located about 100 km south of Phnom Penh. As of May 2002, S had 121 households and T had 126.

Rice farming is a major economic activity for both S and T. As is the case of rice farming in Cambodia in general, mechanization is minimal in the rice farming of these two villages.[3] Floods have often destroyed the wet season rice of village S because it is located in the western edge of the Mekong River floodplain. However, using the receding floodwater, S villagers can grow rice in the dry season on different fields from the rice fields for the wet season rice. In contrast, like most other Cambodian farmers, T villagers can grow rice only in the wet season by relying on rainwater.

Unlike S villagers, some T villagers have upland fields and grow vegetables there, but the scale of such operations is very small. For that reason, this paper addresses only the distribution of rice fields (hence, "land" refers only to rice fields hereafter). Because of large dry season rice fields in S, the average owned land area per household in S (1.35 ha), is larger than that in T (0.68 ha), and therefore farmers in S on average produce more rice than farmers in T.

According to a sample farm survey conducted by the author in 2002,[4] the productivity of rice farming in the surveyed villages is low, as in Cambodia in general. Average paddy yield per hectare is only 2.0 and 1.4 ton for the wet season rice in S and T, respectively ; and that for the dry season rice in S is 2.0 ton. Net income from rice framing for an average-sized farm[5] in S is 357,000 riels, and that in T is 263,000 riels, with which one can provide rice for consumption to a normal size family only for 7.4 months and 5.5 months, respectively.[6] Nevertheless, some households earn relatively high income from rice farming thanks to higher productivity or larger farm size. For example, some farms in S earned more than 1 million riels from rice farming.

Besides rice farming, villagers both in S and T have other income sources, such as animal husbandry, in-land fisheries and off-farm businesses. Because of richer fishery resources around S village, S villagers are more active in fishing than T villagers. Instead, T villagers engage in non-agricultural businesses more actively than S villagers. For example, the proportion of households that engaged in non-agricultural businesses in 2002 is around 40% in T, whereas that in S is only 25%. In addition, more and more T villagers have migrated to cities and other provinces to work. In 2002, 59% of households in T sent at least one migrant worker. For that reason, remittances from the migrant workers has become one of the most important income sources for households in T. In contrast, village S sends out few migrant workers. Judging from the facts above, households in S generally depend more on rice farming, whereas households in T rely more on non-agricultural sectors.

2) Credit market in surveyed villages

The two villages have microcredit programs as of 2002. But these programs have just started in 2000 in T and in 2001 in S. Therefore, during the most of the period of our concern (from 1979 to 2002), villagers could borrow only from informal lenders, such as fellow villagers and traders of fertilizer and rice. Accordingly, only the conditions of informal credit market are relevant to our analysis.

Informal loans are classified as loan with interest or no-interest loans. For the loans with interest, the standard interest rate is 10 % per month, or 120% per year (simple interest is used in the surveyed villages). This high interest rate is generally applied irrespective of loan terms and size and has persisted since the early 1990s. This high interest rate seems prevalent in rural Cambodia, as Murshid [10] shows the average annual rate of interest in his surveyed villages was 105%. For the loans with interest, credit rationing does not seem to be a serious problem in the two villages because most of the villagers the author interviewed thought they could obtain a loan easily if they paid interest. In contrast, no-interest loans in S and T are provided only to close relatives or friends. In addition, no-interest loans are generally provided in smaller amount for consumption purposes for shorter periods. Accordingly, it is not easy to get a no-interest loan in a large amount for a long period to buy assets like land.

3) Land in S and T

In 1979, households in S and T were organized into *krom samaki*. They cultivated rice collectively. In S, the collective farming ended in 1983 and land was allocated to households in that year. In T, land was redistributed in 1979, but collective farming was

continued until 1980. The land area allocated to each household was determined according to the number of household members, with some consideration of age—more land was allocated to adults than to children. As a result, households with more members, adult members in particular, received more land.

Aside from the land received from the government, people in S and T cleared uncultivated land around their villages to get their own farmland. Most of the dry season rice fields in S were acquired by reclamation. T villagers also reclaimed land to the northwest of the village. The reclamation was continued until the middle 1980s when economically cultivable land was almost exhausted. Since then, landholding of each household has changed mainly through purchase, sales and inheritance.

In the surveyed villages, land purchase and sales occurred from the early 1980s, but land markets have been more active since the early 1990s. Though land sales and purchase are mainly made between individuals in the same village, selling land to or buying land from someone in neighboring villages are not uncommon (they cultivate the land bought in other village by themselves). Though some sellers prefer selling land to their relatives, many plots of land were also sold to non-relatives because sellers seek buyers beyond their kin for a higher price.

In the surveyed villages, it is common that a newly married couple usually lives with the parents of husband or wife at first (in many cases a groom comes to the bride's house). A few years later, a couple becomes independent from the parents and establishes a nuclear family. Accordingly, the majority of households in the surveyed villages are nuclear families. This pattern of establishment of household seems common in rural Cambodia.

As is probably common in rural Cambodia, in the surveyed villages, both husbands and wives usually received land from their parents soon after they got married. These land comprise the new couple's land. There seems to be no preferential treatment in inheritance of land according to either sex or birth order. Therefore, even a young couple will have their own land as long as their parents have sufficient land to give them. Even when husband or wife came from another village, it is not uncommon that they received land in their home village from their parents (in fact, the majority of marriages in S and T take place between a male and a female in the same village). If their home village is near S or T village, they cultivate the land by themselves ; if the home village is far, the land is rented out, usually to their parents or a sibling living in that village.

4) Land distribution in S and T

This paper examines the inequality in landholding per household, not per capita, to concentrate on investigating which type of land transaction (such as purchase) has led to the increase in landholding inequality ; if landholding per capita is used, the effect of the change in the number of household members must also be taken into consideration.

Table 1 presents the land distribution in S and T as of 2002.[7] The table shows that land distribution in S is more unequal than that in T, as the Gini coefficient of landholding per household as of 2002 in S (0.531) is higher than that in T (0.372).[8] This is understandable because S has more landless households than T, and because the land size of the largest landowners in S (more than 4 ha) is much larger than the land size of their counterparts in T (less than 2 ha). Table 1 also shows that the Gini coefficients in 2002 are higher than those in 1998 in both S and T, implying that land distribution in the two villages worsened over the four years from 1998. In addition, the rate of increase in Gini coefficient is higher in S than in T.

To get a clue to the causes of the increasing landholding inequality in the surveyed villages, we adopted the following strategy. The land area owned by a household as of 2002 is the sum of the land acquired net of the land lost from a certain starting point in time. Several ways of acquiring land exist, including purchase and redistribution by the government. Similarly, there are several ways of losing land, including sales and inheritance. Therefore, by following Lerman and Yitzhaki [9], we can decompose the Gini coefficient of landholding by types of acquisition and loss. Thereby, we can compute the contribution of each type of acquisition and loss to the overall inequality. The starting point in time for households that received land from the government is set at 1979 ; starting points for

Table 1. Land distribution in the surveyed villages

Village S	All	Owned land area per household in 2002 (ha)						Gini coefficient[c]		
		0	0< <0.5	0.5≦ <1.0	1.0≦ <2.0	2.0≦ <4.0	4.0≦	year 1998	year 2002	change (%)
No. of households	121	14	19	36	30	13	9			
average[a]	1.35	0.00	0.31	0.77	1.42	2.82	5.54			
of which :										
wet season rice fields	0.50	0.00	0.24	0.47	0.67	0.79	1.03			
dry season rice fields	0.84	0.00	0.07	0.30	0.75	2.03	4.50			
								0.497	0.531	7.5

Village T[b]	All	Owned land area per household in 2002 (ha)								
		0	0≦ <0.33	0.33≦ <0.67	0.67≦ <1.0	1.0≦				
No. of households	126	11	19	36	34	26				
average[a]	0.68	0.00	0.23	0.50	0.79	1.39				
								0.368	0.372	2.6

Source : Author's survey in 2002.
a) Average owned land area per housheold of each land-size class. b) T village has only wet season rice fields. c) Gini coefficient of owned land area per household.

Table 2. Contribution of the types of the gain and loss of land to Gini coefficients

	Village S	Village T
Gain		
purchase	0.42	0.39
reclamation	0.33	0.12
from government	0.06	0.30
from wife's parents	0.19	0.09
from husband's parents	0.04	0.09
other gain	0.00	0.02
Loss		
sold	0.03	−0.02
given to children	−0.06	0.01
other loss	−0.01	0.00

Source : Author's survey in 2002.
Note : Calculated over 119 households in S and 126 in T whose data on the types of gain and loss of land is available.

households (couples) getting married after land redistribution are the years of their marriage ; those for households that immigrated into these villages after the land redistribution are listed according to the years of their immigration.

Table 2 shows the results. Purchase is the most important contributor to the inequality : the inequality of purchased area explains 42% and 39% of the overall inequality in S and T, respectively. The next most important way of acquisition is reclamation in S and land redistributed by the government in T, accounting for 33% and 30% of inequality, respectively. Land given by parents also contributed to inequality. Among the types of loss, there is no important contributor to the inequality. In contrast to purchase, the contribution of sales is almost zero in both S and T. The negligible contribution of sales results from the fact that smaller and larger landholders alike sold land, as shown below.

To see the importance of each type of acquisition and loss of land in a different way, Tables 3 and 4 were constructed, which show the owned area of land as of 2002 decomposed by each type of acquisition and loss for each land-size class. In these tables, "initial area" refers to the sum of the area of land received from the government and parents. Therefore, it can be regarded as the initial land endowment of households.

In these tables, three points are noteworthy. First, larger landholders as of 2002 tended to have larger initial area. The larger initial area means they received more land from the government or their parents. As

Table 3. Types of the gain and loss of land, village S

	Land-size group (ha)					
	0	0< <0.5	0.5≦ <1.0	1.0≦ <2.0	2.0≦ <4.0	4.0≦
No. of households	14	19	36	30	12	8
Initial area[a)]	0.65	0.52	0.87	0.92	1.36	2.33
Gain						
purchase	0.26	0.11	0.21	0.44	0.80	3.04
other gain	0.21	0.33	0.27	0.53	1.07	1.83
Loss						
sales	−0.84	−0.25	−0.25	−0.26	−0.23	−0.46
other loss	−0.28	−0.40	−0.33	−0.20	−0.20	−1.16
Owned land in 2002	0.00	0.31	0.77	1.42	2.82	5.58
gain over initial area[b)] (A)	−0.65	−0.21	−0.10	0.50	1.45	3.25
net purchase[c)] (B)	−0.58	−0.13	−0.03	0.17	0.58	2.59
B/A	0.90	0.63	0.36	0.35	0.40	0.80

Source : Author's survey in 2002.
Note : The types of the gain and loss for 119 households whose data is available. a) The sum of the area of the land from the government and the land from parents. b) (Owned land in 2002) − (initial area). c) (purchase) + (sales).

mentioned above, households that had more members, adult members in particular, at the time of land redistribution received more land from the government. Land from parents would be larger when parents owned more land or the number of siblings (to whom parents' land was given) was smaller. Second, land distribution in the two villages has changed mainly through land purchase and sales. Large landholders have sold land as often as small landholders, but the former have purchased much more land than the latter. Accordingly, the net purchased land is large for large landholders, whereas that for small landholders is negative because they sold more land than they purchased. Consequently, the larger the landholding, the larger the gain of land over initial area (referred to as 'gain over initial area in Tables 3 and 4). Smaller landholders tend to reduce land from the initially endowed area because they sold more land than they purchased. Tables 3 and 4 also show that the share of net purchased area in the gain over initial area (B/A) is large for both the largest land-size group and landless households, indicating that landholding of these households has changed mainly through purchase and sales. Third, "other gain" besides purchase also tends to be larger for larger landholders. Because most of "other gain" is reclamation, this fact means that the difference in the area of reclaimed land also contributed to the inequality. Lager landholders could reclaim more land probably because they had more members, especially adult members, in the 1980s.

In summary, Tables 3 and 4 tell us that larger landholders as of 2002 tended to have more land from the start. On top of that, larger landholders gained more land through purchase and reclamation than other households. On the other hand, smaller landholders tended to have smaller initial area and reduced their landholding further as they sold more land than they bought. The difference in initial area resulted from the difference in the area of land received from the government or parents. These observations are consistent with the decomposed Gini coefficients shown in Table 2.

Because land redistribution was implemented by the early 1980s and reclamation was ended in the 1980s, the land from the government and reclamation has not directly contributed to the increase in landholding inequality since the early 1990s. Accordingly, it is concluded that, the landholding inequality in the surveyed villages has increased mainly through land purchase and sales since the early 1990s.

Table 4. Types of the gain and loss of land, village T

	Land-size group (ha)				
	0	0≦ <0.33	0.33≦ <0.67	0.67≦ <1.0	1.0≦
No. of households	11	19	36	34	26
Initial area[a)]	0.11	0.38	0.60	0.73	0.90
Gain					
purchase	0.00	0.02	0.05	0.13	0.47
other gain	0.00	0.01	0.03	0.11	0.17
Loss					
sales	−0.07	−0.08	−0.05	−0.10	−0.07
other loss	−0.04	−0.10	−0.14	−0.09	−0.09
Owned land in 2002	0.00	0.23	0.50	0.79	1.39
gain over initial area[b)] (A)	−0.11	−0.15	−0.10	0.06	0.48
net purchase[c)] (B)	−0.07	−0.06	0.002	0.03	0.40
B/A	0.63	0.40	−0.02	0.52	0.83

Source : Author's survey in 2002.
Note : See the note for Table 3.

5) Land sales for adverse shocks and land distribution

According to Table 2, the contribution of land sales to landholding inequality was negligible in both S and T. However, the effect of land sales on land distribution may vary according to the reason for the sales. For instance, land sales to cope with adverse shocks such as illness and business failures seem more likely to increase landholding inequality. Because selling land to cope with adverse shocks implies deprivation of a means of livelihood, household income will decreases after the land sale. For that reason, those households become less likely to buy the land back. In contrast, when households sell land for other reasons, such as to buy other assets and to finance a business, their income will not decrease concomitant with the land sale (it may increase). Such households may buy land back several years after the original sale.

Land sales for coping with adverse shocks can have a significant effect on land distribution because adverse shocks are the major causes of land sale in the surveyed villages. According to the author's survey, 59.3% of land sales in S and 32.6% in T from 1979 to 2002 were to cope with adverse shocks, such as illness, crop failure, business failure and so on (other reasons for land sales include purchase of other land and assets, raising funds for other businesses or migration, and so on).[9)]

I examined whether land sales for coping with shocks have led to the increase in landholding inequality by the following two methods.

First, I divided households' land sales into two : land sales to cope with adverse shocks and land sales for other reasons, and calculated the contribution of these two types of land sales to Gini coefficient separately. The result shows that land sales to cope with adverse shocks contribute more to inequality than other land sales. In S, while land sales for other reasons *reduce* the inequality by 3.7%, land sales to cope with shocks explain 6.5% of inequality. Village T has similar results ; land sales to cope with adverse shocks contribute 3.4% of inequality, while other sales reduce inequality by 5.5%.

Second, I checked if households that sold land to cope with adverse shocks on average bought less land than other households and did not recovered their landholding after the land sales. Table 5 presents those results. The table reveals that, whereas land sales for adverse shocks have contributed to an increase in the landholding inequality, land sales for other reasons have not, as indicated by the following facts. First, the initial area of the households that sold land for adverse shocks is close to the average in each village :

Table 5. Change in landholding of households that sold land for adverse shocks (the unit of area is ha)

	Village S			Village T		
	Adverse shock[a]	Other reason[b]	All[c]	Adverse shock[a]	Other reason[b]	All[c]
No. of households	44	15	119	13	11	126
Initial area	0.98	0.75	0.95	0.63	0.98	0.62
Gain						
purchase	0.43	0.63	0.51	0.08	0.18	0.15
other gain	0.55	1.13	0.52	0.04	0.06	0.08
Loss						
sold	−0.62	−0.32	−0.33	−0.31	−0.22	−0.07
other loss	−0.41	−0.33	−0.35	−0.07	−0.10	−0.10
Land in 2002	0.92	1.86	1.30	0.38	0.91	0.68
Gain over initial area[d]	−0.06	1.11	0.35	−0.25	−0.07	0.05
Net purchase[e]	−0.19	0.31	0.18	−0.22	−0.03	0.08

Source : Author's survey in 2002.
a) Households that sold land for adverse shocks. b) Households that sold land for reasons other than adverse shocks and buying land. c) All the households in the village. d) (Land in 2002) − (initial area). e) (purchased) + (sold).

in other words, they were average-sized landholders at the time of establishment. Second, the households that sold land for adverse shocks lost more land through sales and bought less land than other households. Consequently, the former experienced larger reductions in land area than other households did : their land size in 2002 is smaller than the village average. In contrast, households that sold land for other reasons in S have more land than the village average in 2002 because they eventually bought more land than they sold.

In fact, most landless households in S sacrificed their land to cope with adverse shocks. Among 14 landless households in S, 10 households sold land to pay medical expenses. Another three households took loans for businesses (duck raising and dry season rice farming) but were compelled to sell land to repay the debts as their businesses failed. Three landless households in T also sold land for medical expenses.

3. Hypotheses

1) Hypothesis on land purchase

(a) Productivity gap hypothesis

The data shown in Section 2 raise the question of why larger landholders tend to buy more land than smaller landholders. Previous studies present two hypotheses for this question.

The first hypothesis, called in this paper the "productivity gap hypothesis", is as follows : because productivity of larger farmers is higher than smaller farmers, the value of land to the former is higher than the latter, which causes land sales from smaller to larger landholders. Carter and Mesbah [6] attribute the productivity gap to credit market imperfection. Suppose that larger farmers have better access to credit while smaller farmers suffer credit rationing (due to the imperfection in the credit market). In such a case, larger farmers can get sufficient funds to achieve higher productivity. Larger farmers can have higher productivity when the economies of scale exist in farming too.

When this hypothesis is valid, the value of land to larger landholders is higher than that to smaller landholders, which means landholding and return from a unit of land are positively correlated. In case of S and T, however, such correlation is not found. According to the survey on rice farming in the two villages in 2002 mentioned in Section 2, the correlation coefficients of operated area (which is equal to owned area for most sample farms) and return from 1 hectare of land (gross income minus cost of labor, capital, current input, and depreciation) are 0.18, 0.04, and −0.32 for the wet season rice in T

and S, and the dry season rice in S, respectively. In addition, the correlation coefficients of operated area and other indicators of land productivity, such as net production and farm net income per hectare, rather have negative signs.

The productivity gap hypothesis seems irrelevant to Cambodia in general for two reasons. First, while the differing ability to get funds is more likely to cause the productivity gap when farmers use a large amount of current inputs such as fertilizers, current inputs are of limited importance in Cambodian rice farming because most farm land is unirrigated and because the use of high yield varieties are low in Cambodia. Second, the economies of scale do not seem to exist in most of Cambodian rice farming areas because mechanization is minimal.

(b) High land price hypothesis

Another hypothesis, which is called the "high land price hypothesis" hereafter and proposed by Binswanger and Elgin [3], is as follows. Let R be agricultural profit from a unit of land, and i be interest rate. Then the net present value of agricultural profit calculated with market interest rate as the discount rate (denoted by NPVAI, hereafter) is expressed as $\sum_{t=0}^{\infty} R(1+i)^{-(1+t)}=R/i$. When a farmer buys a unit of land for price P and borrows at interest rate i to pay the full price of the land, he must pay interest Pi. When land price is so high that $P>$NPVAI, it follows that $Pi>(R/i)i=R$: interest payment is larger than agricultural profit from the land he bought. This means buying land by borrowing money is not profitable, and therefore personal funds are necessary to buy land. As a result, those who have larger amounts of personal funds can buy more land. Because larger landholders are supposed to earn higher income and thus have larger personal funds, larger landholders will buy more land than smaller landholders.

This paper employs this hypothesis because it is consistent with the situation of the surveyed villages. For one thing, the land price in the surveyed villages is much higher than NPVAI. I calculated NPVAI per hectare of rice fields in the two villages based on 50% of gross income as the return from land,[10] which is the standard share rent, and the standard interest rate of 120% in the two villages as the discount rate. The calculated NPVAI per hectare of the wet season rice fields in S and T are 0.38 and 0.24 million riels, respectively, and that of the dry season rice field in S is 0.28 million riels. In contrast, actual price per hectare of the wet season rice field in S, and T, and that of the dry season rice fields in S, are 3.18, 4.85, and 2.45 million riels, respectively.[11] For another thing, the major source of land purchase funds in the surveyed village is households' own funds. According to a survey conducted by the author on land purchase between 1979 and 2002, 72% of land purchase in S and 77% in T were funded solely by land buyers' own funds or by selling other assets ; while only 8 % of land purchase in S and 3% in T were funded only by loans.

But the question remains of what makes land price so high.

One answer is "non-agricultural benefits of land". Binswanger and Elgin [3] argue that land price tend to be higher than NPVAI because benefits of owning land other than agricultural profit are also capitalized into land values. They also argue that a part of "non-agricultural benefit of land" is brought about by credit market imperfection. That is, when borrowing money requires land collateral to cover the default risk, landowners benefit from the better access to credit. In the surveyed villages, land collateral is not required to borrow from informal lenders, but larger landholders may have better access to credit because informal lenders seem to take account of borrowers' landholding when they decide the loan amount.

Binswanger and Elgin [3] also suggest other sources of benefit of owning land : capital gain, store of value against inflation, and tax avoidance. However, these factors are irrelevant in rural Cambodia. First, the real land price in the two villages did not increase during the period from 1994 to 2002. Second, the average annual inflation rate from 1994 to 2002 was merely 4.9%. Third, rural households do not buy land for tax avoidance because they do not need to pay income taxes or taxes for other assets.

On the other hand, a high interest rate (which is another result of imperfection in the credit market) can also make the land price higher than NPVAI even without non-ag-

ricultural benefits of land, as discussed below. Theoretically, land price is determined at NPVA calculated with the opportunity cost of capital to land buyer as the discount rate. That is, land price can be expressed as R/r, where r is the opportunity cost of capital to land buyers. The interest rate was used as the discount rate in the discussion by Binswanger and Elgin [3] because they implicitly assumed that the credit market is perfect ; in such a case, the opportunity cost of capital to land buyers is equal to the interest rate as they can lend their own funds to others as much as they like at interest rate i without incurring risk and transaction cost.[12] When the credit market is imperfect, however, the opportunity cost of capital to those who have a large amount of personal funds can be lower than the interest rate. And when $r<i$, land price R/r is higher than R/i(=NPVAI). This will happen when those who with large personal funds cannot lend their own funds as much as they like at the market interest rate (because, for example, they lack the skill to screen potential borrowers). In such a case, they can only invest their surplus fund in other businesses. But if the marginal rate of return to capital is decreasing with the size of capital, the marginal rate of return to their capital (which is the opportunity cost of capital to them, r) can be lower than the market interest rate. Even when they can lend their own funds as much as they like, if lending entails risk or transaction costs, the expected net rate of return from the lending is lower than the interest rate.

In fact, in the surveyed villages, the opportunity cost of capital seems to be lower than the borrowing interest rate because villagers invest their funds in projects bringing a lower rate of return than the interest rate, as the following examples show. First, the rate of return from most non-agricultural businesses of the villagers, especially those requiring a relatively large initial investment, is much lower than the standard interest rate in the informal credit market in the surveyed villages (120% per year). The author surveyed 17 businesses in S and T with initial investment larger than 500,000 riels (equivalent to the price of around 0.1 to 0.15 ha of rice field) and found that only 4 of the 17 businesses attained the internal rates of returns higher than 100% ; for 11 businesses, the internal rates of returns were lower than 50%. Second, households in the surveyed villages buy gold jewelry with their surplus funds : they save in gold. Because of the low inflation rate in Cambodia in recent years, as mentioned above, savings in gold do not earn a profit.

The borrowing interest rate seems higher than the opportunity cost of capital in rural Cambodia in general because buying gold jewelry is very common in rural Cambodia.

The data and discussion shown above suggest that high land price in the surveyed villages is caused by credit market imperfection, which is manifested as the credit access advantage of owning land and the high interest rate.[13]

To test the high land price hypothesis, econometric analysis of land purchase is conducted in Section 4. The hypothesis is supported if a larger area of purchased land is associated with a larger amount of households' own funds. However, data on households' own funds are not available. Therefore, I use households' own production factors such as land and family labor as well as variables representing households' off-farm income sources as the proxy variables for households' own funds. These variables are supposed to represent households' ability to earn income and thus the amount of households' own funds.

2) Hypothesis on land sales : high interest rate hypothesis

Section 2 shows that land sales to cope with adverse shocks have led to the increase in landholding inequality. I propose a hypothesis that the high interest rate is the major cause of the land sales to cope with shocks, as discussed below.

Suppose a household that does not have savings and sellable assets other than land encounters an adverse shock such as illness of a family member. In Cambodia, formal insurance schemes such as health insurance do not exist at all. Therefore, this household has to borrow money or sell land when it copes with the shock. The household will choose the way that entails lower cost. Because the cost of borrowing is interest, and the (opportunity) cost of selling land is the profit from the land, the household will sell

land when the interest rate is higher than the rate of return from land.

In the surveyed villages, the rate of return from land is much lower than the interest rate. According to the data of land price (P) and NPVAI($=R/i$) shown in 3. 1), the rate of return from land, which is expressed as R/P, is only 6 to 14% in the surveyed villages. This fact manifests credit market imperfection and suggests that households in the surveyed villages sold land to cope with adverse shocks because the interest rate was much higher than the rate of return from land. Some households might refuse to sell land but borrow money to cope with shocks for some reasons (for example, parents may want to keep their land to give to their children in future). When interest rate is so high, however, repaying the loan is difficult and in some cases the borrowers might be pressed by lenders to sell their land to repay the money.

In fact, data indicate that the high interest rate is the major reason why households in the surveyed villages sold land to pay medical expenses. Yagura [11] presents the results of a survey in S and T villages, in which informants were asked how they actually raised money to pay medical expenses when their family members became seriously ill or injured. The following three facts from this survey suggest the role of the high interest rate. First, many respondents sold land to pay medical expenses without borrowing money because they thought they could not repay if they had borrowed money. That answer suggests that high interest rates render debt repayment difficult. Second, there were many cases in which respondents borrowed money first to pay medical expenses and then sold land to repay the money ; and the major reason for selling land in such cases was "could not pay interest". Third, when informants borrowed money with interest, the proportion of the cases in which land was sold was much higher than when informants obtained only no-interest loans.

Yagura [11] also shows that some respondents sold land because they could not borrow—that is, they suffered from credit rationing. However, credit rationing is a minor cause of land sales because it accounts for only 8% of land sales in the sample.

To sum up, the hypothesis on why land is sold to cope adverse shocks is as follows : because the interest rate is higher than the rate of return from land, selling land is less costly than borrowing money ; therefore, households with meager savings are more likely to sell land to cope with shocks. Households with sufficient savings, in contrast, cope with shocks by drawing on savings because the opportunity cost of the savings (which is equivalent to households' own funds) is lower than interest rate in case of the surveyed villages, as mentioned in the previous subsection. This hypothesis is called the "high interest rate hypothesis on land sales" hereafter. If this hypothesis is valid, and if larger landholders have more savings than smaller landholders, smaller landholders are more likely to sell land to cope with adverse shock than larger landholders.

Note that land size will not affect the likelihood of selling land in the face of adverse shocks if the credit market is perfect and thus the borrowing interest rate, the rate of return from land and the rate of return from households' own funds are equal to each other for every household. In such a case, the cost of coping with adverse shocks does not vary according to how households raise money.

Low income level or low productivity of farming, as mentioned in Section 2, can be regarded as the root cause of land sales because that makes households' savings smaller. Nevertheless, the high interest rate does still matter because there would be fewer land sales if the interest rate were not higher than the rate of return from land.

To test the high interest rate hypothesis, it is desirable to examine the effect of the interest rate of loans for medical expenses on land sales. However, data necessary for such an analysis are not available. Instead, in Section 5, I investigate the determinant factors of land sales among households that had seriously ill members from 1998 to 2002. If the high interest rate induces land sales for medical expenses, households with less savings (households' own funds) are more likely to sell land. Because data on household's own funds are not available, I use variables representing households' owned production factors and off-farm income sources as proxy variables.

The land sales analysis is only conducted for S village because in T, only 4 land sales were made among households that had seriously ill members from 1998 to 2002.

3) Difference between S and T

As shown in Table 1, landholding inequality and its increasing rate are higher in S than in T. The two hypotheses proposed above must be able to explain the difference between the villages. In this subsection, based on the two hypotheses, I propose two lower level hypotheses on the difference between the villages.

The first hypothesis is as follows : because village S depends more on farming compared with village T (as mentioned in Section 2), landholding has a stronger positive effect on land purchase and a stronger negative effect on land sales to cope with shocks in S than in T. This hypothesis needs some explanation. The high land price hypothesis and high interest rate hypotheses predict that households with larger personal funds can buy more land but will sell less land to cope with adverse shocks. This means that the stronger the positive correlation between landholding and households' own funds, the more likely it is that landholding inequality will increase. Landholding will have a stronger positive correlation with households' own funds where farming is of greater importance as an income source. As a result, a village relying more on farming will experience a larger increase in landholding inequality. To test this hypothesis, I compare the effect of landholding on land purchase between S and T using the result of land purchase analysis in Section 4. A similar analysis should be done for land sale, but that is impossible because econometric analysis of land sales is conduced only for S.

Another hypothesis, which is based on the high interest rate hypothesis, is as follows : because S villagers have narrower access to cheaper credit when they cope with shocks than T villagers, S villagers are more likely to sell land for coping with shocks than T villagers. Data are supportive of this hypothesis. First, according to Yagura [11], S villagers actually have limited access to no-interest loans in comparison with T villagers when they raise money to treat illness, though the reason for that is not investigated. Second, S villagers were actually more likely to sell land to cope with illness in the family. For example, of the cases in which households had seriously ill members in a certain year or the previous year during the period from 1998 to 2002, land was sold in 20% of the cases in S, while only in 5% in T.

4. Determinant Factors of Land Purchase

In this section, I use household panel data for the period from 1998 to 2002.[14] The dependent variable is the area of land purchased in each year. Explanatory variables include owned production factors as of the beginning of each year and variables representing off-farm income sources in the previous two years. These variables are supposed to represent households' income level and hence the amount of their own funds. Demographic variables are also used as explanatory variables. The names and definitions of these variables are presented in Table 6.

Owned production factors include owned area of land (OWLAND) and the number of family laborers (LABOR). The effects of these variables are expected to be positive. In particular, the effect of landholding is expected to be larger in S than in T, as discussed in the previous section. Because the marginal effect of owned production factors might diminish with their values, the square of X or $\log(X+1)$ (X=OWLAND, LABOR) are used (namely, LABORSQ, LLAND and LLABOR). I add one to X in the logarithm because these variables are zero for some observations (for example, the value of OWLAND of landless households is zero).

Fixed assets such as cattle and equipment for non-agricultural businesses such as rice mills were not used because data was not available. But this omission is unlikely to bias the estimation very much because these fixed assets are used for farming or non-agricultural businesses, and farming income is determined mainly by landholding while income from non-agricultural business is represented by another variable described below.

As variables representing off-farm income, I use the number of years in which households engaged in non-agricultural businesses or salaried work[15] in the previous two years (NFI), and the number of years in which households raised ducks in the previous two

Table 6. Definitions of variables for econometric analysis

Variable	Definition
(Dependent variables)	
PLAND	area of land purchased in each year (ha).
SLAND	area of land sold in each year (ha).
(Explanatory variables)	
OWLAND	area of owned land as of the beginning of each year (ha).
LLAND	log(OWLAND+1).
LABOR	the number of household members aged 15 to 59 as of the beginning of each year (person).
LLABOR	log(LABOR+1).
LABORSQ	the square of LABOR.
DEPEND	the number of dependant as of the beginning of each year (the number of household members minus LABOR).
LDEPEND	log(DEPEND+1).
DEPENDSQ	the square of DEPEND.
NFI	the number of years in which any household member was engaged in off-farm self employment (and did not incur loss) or salaried job (not migrated) in the previous 2 years (year). Snack making and palm sugar making are excluded.
DUCK	the number of years in which any household member was engaged in duck raising (and did not incur loss) in the previous 2 years (year).
PSM	the number of years in which any household member was engaged in palm sugar making in the previous 2 years (year).
AGE	the average age of household head and his or her spouse as of the beginning of each year. For households of widows (widowers), the ages of wives (husbands) are used (year).
EDH	index of husband's education (No education : 0 ; grade 1-3 : 1 ; grade 4-6 : 2 ; grade 7-9 : 3 ; grade 9< : 4) (0 for households of widows).
EDW	index of wife's education (using the same criteria as husband's) (0 for households of widowers).
FACTORY	the total number of months in which household members migrated to work at factories in the previous two years (labor* months).
LFACTORY	log(FACTORY+1).
NONFACTORY	the total number of months in which household members migrated to work (except factory work) in the previous two years (labor* months).
LNONFACTORY	log(NONFACTORY+1).
ILL	the total number of patients for whom 200,000 riels or more were spend for treating the illness in the respective year and the previous year (person).
Y 98-Y 01	dummy variables for year 1998, 1999, 2000 and 2001, respectively.

Source : Prepared by the author.

years (DUCK). Among animal raising, only duck raising was used as a variable because the scale of duck raising is much larger than other animal raising such as pig rearing. To make sure that these variables more correctly represent households' non-farm income, I omit years in which households suffered loss in non-agricultural businesses or duck raising. The effects of these variables are expected to be positive.

There were various kinds of non-agricultural businesses in the surveyed villages. Ideally, each type of business should be represented by different variables. But that inflates

the number of explanatory variables. Therefore, I introduce a business-specific variable only for palm sugar making (PSM)[16] because that is the most popular business in T (in contrast, nobody engaged in this business in S). On the other hand, snack making, which many T villagers engaged in, was excluded from non-agricultural businesses because income from snack making is generally very small.

For T village, I also include variables of migration : the total number of months in which households sent out migrant workers in the previous 2 years. Such variables were not used for S village because there have been very few migrant workers from S during the relevant period. To represent the positive effect of migrant work more precisely, I exclude migrant workers who did not remit or bring back money with them to their family. The migrant work variable is further divided into two : migrant work at factories (garment and shoe factories) (FACTORY) and other migrant work (NONFACTORY). Because factory workers on average earned higher wages and remitted more to their family than other migrant workers, FACTORY is expected to have a stronger positive effect on land purchase. In contrast, NONFACTORY can have negative effect on land purchase because relatively poorer households seem to engage in non-factory migrant work. This presumption is based on the fact that wages for non-factory migrant work are low ; migrating to work even though the wage is low suggests they had hard time to make ends meet. Because the marginal effect of these migration variables may diminish with their values, log(X+1) (X=FACTORY or NONFACTORY) is used in the estimation.

The effect of educational level of husband and wife (EDH and EDW) would be positive if education had a positive effect on income, or if education is positively correlated with savings rate. In addition, the effect of education can decrease with age because people acquire knowledge through experience, as they get older. To reflect the changing effect of education according to age, an interaction term of educational level and age was introduced. The signs of the transaction terms are expected to be negative.

The effect of the number of dependants (DEPEND) is expected to be negative because consumption expenditures are supposed to increase with the number of dependants and thus households with lager numbers of dependants will have smaller savings. I also use the square of DEPEND (=DEPENDSQ) or log (DEPEND+1) (=LDEPEND) to reflect the possible diminishing effect of DEPEND.

Dummy variables of years (Y 98 to Y 01) are also introduced to reflect the difference in land market conditions between years.

Although the data sets are panel, the pooled Tobit model, not the random effect Tobit, is employed because the individual effects were not significant when random effect Tobit models were estimated. The models were estimated using the maximum likelihood method.

Table 7 shows the estimation results. In general, the coefficients for owned production factors and variables representing off-farm income are positive and significant in both S and T, supporting the hypothesis that households with larger amounts of their own funds bought larger areas of land. In particular, the positive and significant effects of off-farm income sources strongly support the high land price hypothesis because this indicates that the larger amounts of households' own funds, not the larger size of landholding *per se*, enable households to buy larger areas of land.

As expected, the coefficient for LLAND is positive both in S and T. In T, LLABOR has a positive and significant effect too. In the case of S, however, the coefficient for LABOR is significant only when the square of LABOR (LABORSQ) is included (using only LLABOR did not result in significant coefficient). Furthermore, the coefficient for LABORSQ is negative. According to the marginal effect of LABOR at sample mean, the effect of LABOR is negative when LABOR is equal to or more than 4. This result indicates the existence of surplus labor among households in S. This is not so surprising because S villagers, unlike T villagers, did not migrate for work even when there were not sufficient employment opportunities in and around the village.

The coefficients for NFI are positive and significant in both S and T. This result suggests that even smaller landholders could buy

Table 7. Estimated coefficients for determinants of land purchase and land sales (tobit model ; pooled data for the period from 1998 to 2002)

	Land purchase[a]				Land sales[b]	
	Village S		Village T		Village S	
	Coefficient	*t*-value	Coefficient	*t*-value	Coefficient	*t*-value
Constant	−4.29 ***	−4.58	−0.82 ***	−3.63	−7.758 **	−2.23
LLAND	0.56 ***	3.12	0.23 *	1.65	−3.416 **	−2.33
LABOR	0.75 **	1.97				
LLABOR			0.36 ***	2.70	4.146 **	2.44
LABORSQ	−0.11 *	−1.93				
DEPEND	0.27	1.56				
LDEPEND			−0.16 **	−2.57	2.357 **	2.07
DEPENDSQ	−0.05 *	−1.66				
AGE	0.02 **	2.10	−0.01	−1.53	−0.341	−0.73
EDH	0.97 ***	2.71	0.04	1.13	0.260	0.68
EDW	0.19 **	2.01	−0.05 *	−1.67	0.097	0.31
EDH×AGE	−0.03 ***	−2.83				
NFI	0.29 **	2.14	0.08 **	2.11	−1.502	−1.18
PSM			0.01	0.27		
DUCK	−0.02	−0.09	0.16 *	1.90	0.288	0.37
LFACTORY			0.07 **	2.20		
LNONFACTORY			−0.07 *	−1.90		
ILL					1.231	1.51
Y 98	0.27	1.03	0.06	0.61		
Y 99	0.22	0.84	0.09	0.90		
Y 00	−0.02	−0.09	−0.00	−0.02		
Y 01	−0.25	−0.87	0.10	1.08		
Standard deviation	1.09		0.38		1.085	
Log likelihood	−186.12		−117.76		−25.01	
No. of observations	555		580		60	
No. of positive observations	57		51		12	

Source : Prepared by the author.
Note : Household level panel data from 1998 to 2002 are used. a) Dependent variable is PLAND (area of land purchased in each year). b) Dependent variable is SLAND (area of land sold in each year). Only observations in which households had a seriously ill member in the respective year or the previous year are used.
*** : p-value<0.01 ; ** : <0.05 ; * : <0.1.

land if they engaged in non-agricultural businesses or salaried jobs. However, the coefficient for PSM in T is not significant. This result can be interpreted as the effect of a labor shortage : because palm sugar making starts around December and January, which is also the harvesting season of rice, those who engaged in palm sugar making might have difficulty in expanding their farm size.

As expected, the coefficient for DUCK is positive and significant in T. But that in S is not significant. This result also seems to be the effect of a labor shortage. Duck raising is a labor intensive and year-round business. On the other hand, S villagers engage in rice farming nearly all year round, as they plant rice in both the wet and dry seasons. Therefore, those who raise ducks in S may have difficulty in increasing farm size.

The coefficient for LFACTORY is positive and significant, as expected. In contrast, the coefficient for LNONFACTORY is negative

and significant, which suggests that those who migrated for non-factory jobs came from poorer households, as discussed above.

The coefficients for interaction terms of educational levels and age are significant only for husbands in S. Therefore, only the transaction term for husbands in S was included in the final estimation presented in Table 7. The effect of education differs depending on sex and village. In S, the educational level of wives (EDW) is positive and significant for all ages, and that of husbands (EDH) is positive when age is lower (according to calculated marginal effect of education, the effect is positive below age 34). In T, the coefficient for EDH is positive, while that for EDW is negative. One possible explanation for the negative effect of education is that if those who with higher education are better at running off-farm businesses, they will tend to invest their own funds mainly in off-farm sectors, not in land.

In T, the coefficient for LDEPEND is negative and significant ; suggesting a larger number of dependants reduces a household's own funds. In S, a better result is obtained when both DEPEND and DEPENDSQ are included. The coefficient for DEPEND is positive, though insignificant, and that for DEPENDSQ is negative and significant at the 10% level. The marginal effect of DEPEND shows that the effect of DEPEND is negative when its value is larger than 2 in S. As sample mean of DEPEND is 2.8 in S, the hypothesis that the number of dependant has negative effect on land purchase is supported in S only for those households with a relatively larger number of dependants.

Finally, I compare the effect of landholding on land purchase between S and T. Based on the estimation result presented in Table 7, the marginal effect of landholding at 1 ha is 0.028 in S, which is about 3 times higher than that in T (0.0093). Marginal effects in S are also higher than those in T even when they are calculated at other landholding levels. Therefore, we can conclude that the effect of landholding on land purchase is larger in S than in T. This result supports the hypothesis that village S has higher landholding inequality because it relies more on farming in comparison with T.

5. Determinant Factors of Land Sales in the Face of Adverse Shocks

To analyze the determinant factors of land sales to cope with shocks, this section uses a subsample of the panel data from 1998 to 2002 in village S. Specifically, from the panel data used in Section 4, I drew observations in which households had seriously ill members in the respective year or the previous year. For example, if a household had a seriously ill member only in 1999, the data of this household for 1999 and 2000 were drawn. "Seriously ill member" is defined here as a sick person for whom 200,000 riels or more were spent on medical expenses.

There are two reasons for not sampling only years in which households had seriously ill members. First, the effect of illness can appear in the following year. In fact, it is not uncommon that households borrowed money first to treat illness and sold land in the next year to repay the money. Second, if only years when households had seriously ill members are sampled, the number of observations is too small to estimate the model.[17)]

The dependent variable is the area of land sold. Land was sold in 12 observations out of the 60 observations drawn. Like the analysis of land purchase, explanatory variables include variables supposed to determine the amount of households' own funds, such as land, labor, the number of years in which households engaged in non-agricultural businesses or duck raising, as well as demographic variables such as the number of dependants. The definitions of these variables are presented in Table 6. For landholding, family labor and dependant, LLAND, LLABOR and LDEPEND are used respectively to capture the possible diminishing effects. In addition, the total number of seriously ill members both in the respective year and the previous year (ILL) is also used as an explanatory variable to reflect the severity of the shock. Ideally, the amount of medical expenses (and other expenses incurred because of the illnesses) should be used, but such data are not available.

The high interest rate hypothesis for land sales predicts that the signs of the coefficients for land, labor, non-agricultural businesses and duck raising are negative. The ef-

fect of labor, however, might be positive (inducing land sales) when its value is large because having too many working-age members can be a burden on a household, as the estimation result of land purchase in S suggested. The effect of the number of dependants is expected to be positive, because consumption expenditures will increase and thus households' savings will decrease with the number of dependants. The educational level of husband and wife will have a negative effect on land sales if it increases households' income and thus savings. ILL is expected to have a positive effect because medical expenses will increase with the number of patients.

The doubly censored Tobit model—a model with both lower and upper censoring points—is employed. The lower censoring point is zero. The upper censoring point is the area of owned land (OWLAND) because one cannot sell more land than she or he owns. The model was estimated by the maximum likelihood method.

The estimation result is presented in Table 7. The coefficient for LLAND is negative and significant, supporting the hypothesis. Also consistent with the hypothesis, the coefficient for LDEPEND is positive and significant. The coefficient for LLABOR is positive and significant (when LABOR and LABORSQ are included, the coefficients for these two variables are not significant) which is inconsistent with the hypothesis. A possible reason for this result is that those households that sold land had surplus labor, as discussed above.

The coefficients for NFI and DUCK are negative, but not significant. This result might be caused by the small number of observations. Raw data suggest that NFI in particular seems to have a negative effect on land sales. Among 12 observations in which land was sold, only 1 observation (or 8%) has a positive value for NFI (that is, the household engaged in a non-agricultural business in the previous 2 years) ; while among 48 observations in which land was not sold, 11 observations (or 23%) have positive NFI. These data suggest the possibility that households with off-farm income are less likely to sell land in the face of illnesses.

The effect of age and education are not significant. The coefficient for ILL is positive as expected, but not significant.

In summary, though the estimation result is not totally supportive of the high interest rate hypothesis, the hypothesis is partly supported by the result that landholding had a negative and significant effect on land sales when households had seriously ill members. This result also means that illness of family member increases the inequality in landholding by forcing smaller landholders to sell land.

Landholding will have a negative effect on land sales even when smaller landholders sell land because of credit rationing. However, as mentioned in Section 3, credit rationing is not as important a factor for land sales as the high interest rate in the surveyed villages. Even if the effect of credit rationing is not minor, credit market imperfection is still considered to be the chief cause of land sales to cope with adverse shocks.

6. Conclusion

In the surveyed villages, the inequality in landholding has increased mainly through land market. Larger landholders have increased their land by purchasing more land than others. Some other households sold their land to cope with adverse shocks such as illness, becoming smaller landholders or landless.

Through the investigation of data from the two villages and econometric analyses of the determinants of land purchase and sales, this paper found that this pattern of land purchase and sales is caused by the high land price and high interest rate. The high land price—higher than the net present value of agricultural profit based on interest rate as the discount rate (NPVAI)—makes buying land with loans unprofitable, and therefore those who are supposed to have larger amounts of their own funds, such as larger landholders, could buy more land. Because the interest rate is higher than the rate of return from land, coping with shocks by borrowing money is more costly than selling land. Therefore, smaller landholders, who are supposed to lack savings to draw on, are more likely to sell land to cope with adverse shocks than larger landholders.

The high land price and high interest rate seem to be caused by credit market imperfec-

tion. Data indicate that the land price is higher than NPVAI because the interest rate is higher than the opportunity cost of capital to the land buyer and because the credit access advantage of owning land is capitalized into the land price. The fact that the interest rate is higher than the rate of return from land itself is a manifestation of credit market imperfection.

The mechanism of increasing landholding inequality described above is considered to hold true of rural Cambodia in general because a high interest rate is common in rural Cambodia.

This paper's findings suggest that interventions in the rural credit market, especially those leading to interest rate reduction, can be effective in mitigating landholding inequality in Cambodia. Alleviating the burden of medical costs on the rural population is also expected to curb the increase in landholding inequality in Cambodia by reducing land sales for medical expenses.

1) Gini coefficients of landholding per household, based on data of six national level household surveys in the late 1990s, range from 0.49 to 0.66 (Chan, Tep and Acharya [8]). Gini coefficients at the village level, calculated using data of nine villages in 2001, range from 0.45 to 0.69 (Chan and Acharya [7]).
2) In this paper, *adverse shock* refers to "an unexpected event that reduces household income or increases household expenditures, such as illness or crop failure". To *cope with a shock* refers to "raising money to compensate for the income shortfall or to pay the increased expenses, for example, by selling assets and borrowing money".
3) Use of threshers is increasing for the dry season rice in S, but use of tractor is limited to a few farmers (they hire operators coming from other villages) in both S and T.
4) The numbers of the sample farms of the wet season rice in S and T are 15 and 20, respectively, and that of the dry season rice in S is 12.
5) "Average farm size" is the average area of owned land of landholders (excluding landless households) in respective villages. The average-size farm in S is 1.57 ha and that in T is 0.74 ha.
6) I assume that a family has 5 members (which is a normal household size in S and T) and 1 person consumes 14 kg of rice per month, with a rice price of 800 riels/kg.
7) The figures in Table 1 include the area of land that households in the two villages own in other villages, such as home villages of husbands or wives.
8) The Gini coefficient of landholding per capita as of 2002 in S is 0.542 and 0.377 in T, which are about the same as per household Gini coefficients. This rough equivalence indicates that the landholding inequality in the two villages is unrelated to the difference in household size.
9) The author asked heads of households that sold land during the 1979-2002 period the reasons for the land sales. Through the survey, 113 land sales were identified in S and 45 sales in T. These include only the land sales made by households still living in these villages in 2002. For some land sales, the direct reasons were "to repay debt". For such land sales, the reasons for owning the debts are regarded as the reasons for the land sales.
10) The data on gross farm income is based on the farm survey mentioned in Section 2.
11) These land prices are simple averages of land prices (2002 constant price) in actual land purchase and sales in the two villages between 1994 and 2002.
12) Transaction cost for lending money includes cost of screening loan applicants and collecting debts.
13) Land price can be higher than NPVAI when the borrowing interest rate charged to large landholders is lower than the standard interest rate i, which is charged to small landholders. There can exist such an interest rate gap because large landholders have more assets as collateral and thus have lower default risk than small landholders. In such a case, the opportunity cost of funds to large landholders is also lower than i, and thus they can put higher land price than NPVAI. Although this theory seems applicable to rural economies in developing countries in general, it cannot explain the case of S and T villages because in these two villages the borrowing interest rate does not vary with the size of the borrowers' landholding.
14) Only the data for households (111 households in S and 116 in T) that had resided in the respective villages through the period from 1998 to 2002 were used.
15) In the surveyed villages, teachers and police officers are the only salaried workers.
16) They make sugar from the nectar of the palmyra palm.
17) In that case, we have only 37 observations.

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