Empirical research on farm households' attitude and behaviour for cultivated land transferring and it's influencing factors in China

Empirický výzkum postojů a chování zemědělců ve vztahu k transferům obdělávané půdy v Číně a faktory, které je ovlivňují

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Abstract: Cultivated land transfer is an important way to deal with the conflict between the cultivated land fragmentation of landholders and the large-scale agricultural modernization in China. The farm households, as the direct user of cultivated land, play a key role in the cultivated land transfer. For this paper, a survey of 1 396 farm households in 74 villages, 64 townships, 42 counties in Jiangxi, the traditional agricultural province, was conducted. Using this information, a logistic regression model was employed and the attitudes of those farm households were analyzed using the family characteristics, the household economic factors and the resource endowments. The results showed that there is a little incentive for the cultivated land transfer and no macro-environment exists for the cultivated land transfer market because of the low economic benefits. Farm households which moved out to urban areas for employment play the most important role in the cultivated land transfer and become the largest force to drive the cultivated land transfer out. Family income also affects the cultivated land transfer; the income of farm households transferring cultivated land in is much lower than those of the cultivated land transferring out. In addition, the topographic characteristic of cultivated land is also an important factor influencing the cultivated land transfer; it is easier to transfer land out if the terrain is flat, but it is more difficult if the land is fragmented.

Key words: farm households, cultivated land transfer, attitude; behaviour, empirical study

Abstrakt: Transfery obdělávané půdy jsou významným způsobem, jak se vyrovnat s protikladem mezi fragmentací obdělávané půdy a procesem velkovýrobní modernizace v Číně. Zemědělská hospodářství, která jsou přímými uživateli obdělávané půdy, hrají v těchto transferech klíčovou roli. V rámci této studie byl proveden výzkum 1 396 zemědělských hospodářství v 74 vesnicích 64 městských okrsků ve 42 okresech provincie Jiangxi, která je tradiční zemědělskou provincií. S využitím těchto informací byl vytvořen logistický regresní model, který analyzuje postoje těchto zemědělských hospodářství s využitím rodinných charakteristik, faktorů ekonomiky domácnosti a vybavení zdroji. Výsledky ukazují, že existuje pouze málo vlivů působících ve prospěch transferu obdělávané půdy a není vytvořeno makroekonomické prostředí pro tyto transfery, poněvadž existující ekonomické přínosy jsou velmi nízké. Zemědělské domácnosti, které se přestěhovaly do městských oblastí kvůli pracovním příležitostem, hrají nejdůležitější úlohu v transferech obdělávané půdy a staly se největší silou působící v procesu tohoto transferu směrem ven. Transfery obdělávané půdy jsou také výrazně ovlivněny příjmem zemědělských domácností. Příjem domácností, v nichž se uskutečnily transfery obdělávané půdy směrem dovnitř, jsou výrazně nižší než u domácností, kde došlo k transferům obdělávané půdy směrem ven. Významným faktorem ovlivňujícím transfery obdělávané půdy jsou dále rovněž topografické charakteristiky půdy. V případě pozemků v rovinném terénu jsou transfery směrem ven snazší, naopak komplikovanější jsou v případě velké roztříštěnosti pozemků.

Klíčová slova: zemědělské podniky, transfer obhospodařované půdy, postoje, chování, empirická studie

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The Household Responsibility System (HRS) was carried out at the end of the 1970s and beginning of the 1980s. Before the HRS, rural land was owned and managed collectively. Under the HRS, land use rights for arable land were generally assigned to individual households for a period of 15 years and this period was adjusted to 30 years by the new land administrative laws issued in 1998 (Tan et al. 2006) The ownership of land remained with the collective such as the village or the villagers' group. The implementation of the HRS in China's rural areas has greatly motivated the productive enthusiasm of the peasants, progressed the rural economy, provided the backup for the rapid development of the national economy after the reform and opening-up, and also rendered an immortal service to the liberation and development of the productive forces in the China's rural areas (Lin 1994). Land use rights for arable land were generally assigned to individual households through land contracting and were proportionate to their family size due to the high population pressure and the limited availability of arable land. This made the landholding sizes of farm households small. With the development in social economic circumstances of the villages, however, the conflict between the household production with a small-size land holding and the economic liberalization or the market-oriented economy has become increasingly serious (Qian 2002; Tan et al. 2003). Cultivated land transferring, which has been viewed as a tool to promote the land concentration, planting proficiency, and to increase the use of agricultural machinery, is an important way to coordinate the HRS and the modern agricultural construction under the condition of market economy in China (Ma et al. 2002). Because cultivated land is legally owned by the village collective, the sale of arable land in the legal sense does not exist (Yao 2000). Therefore, land transferring, in this paper, means to lease, to exchange, and to subcontract or transfer the use rights of the contracted land obtained through the household contracts. These transferring patterns are permitted by the law of the People's Republic of China on the Land Contract in Rural Areas issued in 2002. Some families may ask someone else to cultivate their contracted land and let the cultivators keep a certain amount of the yield from the land as an exchange (Zhang and Makeham 1992). This is also viewed as land transferring for the purpose of this paper. Farm households are the proximate agents of land production and their attitude and behaviour are important in the decision of the cultivated land transfer (Tan et al. 2001; Chen et al. 2005). Study on the farm households' attitude and behaviour of cultivated land transfer can provide a basis for increasing the enthusiasm of land transferring in farm households, can help to make policies that regulate land transferring and help to understand the farm households' attitude and behaviour for the cultivated land transferring along with analyzing their influencing factors.

LITERATURE OVERVIEW

There have been many studies that focus on land transferring and address the determinants of the farm households' behaviour regarding the cultivated land transferring. Different influencing factors were examined in different studies. For example, an investigation in Bulgaria showed that land property rights and contracting conditions had a great influence on the land lease under incomplete capital and labour markets (Noev 2008). In transforming countries such as Hungary, the impact of an incomplete market on the rural land market was more serious (Vranken and Swinnen 2006). A study in Nicaragua also showed that an incomplete credit market would resist the formation of land market (Deininger et al. 2003). The impact of the policy and the interest in the development of a land market is another hot spot in this research area. Some studies showed that the policy reform could also exert influence on land transferring in Nicaragua (Deininger et al. 2003) and the impacts of policy were also reflected in India, Russia (Awasthi 2009) and the Czech Republic (Lostak et al. 1999; Hudeckova and Lostak 2002; Doucha and Divila 2005; Latruffe et al. 2008). The influence of land property rights on the land market has also been examined (Zaibet and Dunn 1998). It has also been shown that farm households or farm sizes have certain influences on land transferring (Zaibet and Dunn 1998; Vranken and Swinnen 2006). Furthermore, the characteristics of farm households such as the educational level, the age and health level have impacted land leases (Teklu and Lemi 2004). Influencing factors of the Russian rural land market were summarized as structural factors, capital factors and labour factors (Wegren 2003).

In a Chinese cultivated land market study, it was noted that there was a relationship between the development of the labour market and land lease in China (Yao 2000; Kung 2002). An investigation of the farm households' behaviour in Haining and Fenghua of the Zhejiang province showed that with the increase of income per capita, the development of non-agricultural industries and the increase of educational level, land transferring willingness of farm households increased first and then decreased (Qian 2003). Another study on the development of

the rural land lease market of the Zhejiang Province, China also showed that the development of labour market, especially the non-agricultural labour market, was related to the rural land lease (Zhang et al. 2004). An investigation of the driving forces of land transferring in farm households in Shanghai, Nanjing, Taizhou and Yangzhou proved that factors such as the non-agricultural employment rate, the educational level in the family, the agricultural net income per unit area, the distance from home to a classified highway, the family Engel coefficient, the economic development level of the region and the family domicile played a decisive role in land transferring (Du and Huang 2005). A study in Fenghua and Haining of the Zhejiang showed that the influencing factors of the rural land transferring were classified as the occupation, the family per capita income, the land area per capita and the family principle work. It was thought that the impact of the family income per capita was the most obvious and the land area per capita also played an important role (Wu 2002).

Rural land transferring is comprised by two interdependent parts – transferring out and transferring in. As a receptor and a resource, transferring cannot happen without either of them. Their influencing factors are different, however; transferring in and out are analyzed as a whole only in a few studies. Moreover, most of the previous studies focused on land transferring itself instead of the farm households' attitude. This paper analyzes the farm households' attitude and behaviour for the cultivated land transferring and their influencing factors in the view of transferring out and in through investigations and a firsthand information of the Jiangxi Province, an agricultural and labour export province. This paper also provides information for policy makers on increasing the driving forces of land transferring out and in.

METHODOLOGY AND DATA

The model

If it is assumed that the farm households' purpose is to maximize their income and that their activities include agricultural production and non-agricultural activities, then the objective function is as follows.

$$R = Z_1 (A, L_1, K, Z_1) + Y_2 (L_2, Z_2) \quad (1)$$

where R is the total incomes of the farm households, Y_1 is their agricultural production function, A is the land area used in agricultural production, L_1 is labour used in agricultural production, K is capital used in agricultural production, Z_1 is other influencing factors in agricultural production except land, labour and capital, Y_2 is the non-agricultural income function, L_2 is non-agricultural labour, Z_2 is other non-agricultural income influencing factors except labour.

Then, to maximize the incomes, all of the first derivatives of income function R are equal to zero. Based on equations whose first derivations are zero, we can obtain the optimum solution A^* of arable area.

$$A^* = A^* (L_1, L_2, K, Z_1, Z_2) \quad (2)$$

Supposing the land lease area is S, then, the relations of A^* and S are as follows:

$S - A^* \succ 0$, $S - A^* \prec 0$ and $S - A^* = 0$.

When $S - A^* \succ 0$, land should be rented out.

When $S - A^* \prec 0$, land should be rented in.

When $S - A^* = 0$, land should be neither rented in nor rented out.

Then, household land transferring should be expressed as:

$$l = S - A^* = l(L_1, L_2, K, Z_1, Z_2, S) \quad (3)$$

Then, the solution whether land transferring should be circulated can be expressed by the following equation:

$$Y = \begin{cases} = 1, & if \quad |l| \succ 0 \\ = 0, & if \quad |l| = 0 \end{cases} \quad (4)$$

Then, the decision of land transferring can be simulated by the logistic-function or the probit-function models.

Farmer behaviour of the cultivated land transfer, the variable to be analyzed in this paper, is a qualitative dichotomous variable, that is, with or without a cultivated land transfer. The study established a logistic model to carry out a regression analysis. The logistic model is applicable to the analysis with a dependent variable as a dichotomous variable and is an ideal model for analyzing the behaviour of the individual decision-making (Huang and Huang 2005; Lu 2006).

The form of the probability function of Logistic is as follows:

$$P = \frac{Exp(Z)}{1 + Exp(Z)} \quad (5)$$

In equation (5), Z is the linear combination of variables X_1, $X_2 \ldots X_i$:

$$Z = b_0 + b_1 X_1 + b_2 X_2 + \ldots + bX = b_0 + \sum_{i=1}^{n} b_i X_i \quad (6)$$

In the process of data statistics and analysis, the probability of farmer with the behaviour of the culti-

Table 1. Variables related to the logistic model

Variable	Name of variable	Description of variable	Average	Standard deviation	Type of variable
X_1	total family population	total population size of the family; unit: people	3.27	1.98	continuous variable
X_2	total agricultural workforce	the total number of people who engage in agricultural production; unit: people	1.96	1.21	continuous variable
X_3	ratio of migrant workers	the number of migrant workers divided by the total family workforce; unit: %	0.41	0.34	continuous variable
X_4	average annual income per capita	total annual income divided by the total population; unit: 1 000 cny[a]	3.35	3.14	continuous variable
X_5	proportion of cultivated land income	income from cultivated land divided by the total family income; unit: %	0.25	0.27	continuous variable
X_6	terrain	highland = 1; hilly region = 2; plain = 3			dummy variable
X_7	area of cultivated land per capita	total contracting area of the cultivated land divided by the total population; unit: ha	0.06	0.11	continuous variable
X_8	fragmentation degree of cultivated land	total area of the cultivated land divided by the total portion of the cultivated land; unit: ha/portion	0.05	0.17	continuous variable

[a]1 CNY is about 0.106 EUR

vated land transfer is set as $P(Y = 1)$, and the probability of farmer without the behaviour of the cultivated land transfer is equal to $1 - P(Y = 0)$. For the logistic regression analysis, the logit transformation of P is often carried out, that is

$$Logit P = \ln\left(\frac{P}{1-P}\right) \quad (7)$$

After logit transformation,

$$LogitP = P\ln\left(\frac{P}{1-P}\right) = b_0 + \sum_{i=1}^{n} b_i X_i \quad (8)$$

In this way, the linear formula between the function of probability and the independent variable can be worked out.

The independent variable Y is set to be the farmer behaviour of the cultivated land transfer. If farm households have the behaviour of the cultivated land transfer, then the independent variable is 1. If farm households do not have the behaviour of the cultivated land transfer, then the independent variable is 0. It is generally considered that the main factors that influence the cultivated land transfer are the basic conditions of farm households, such as population, labour, economic income and structure and the resource state of the possessed cultivated land. For this reason, in the study, the factors of the independent variable which influence the cultivated land transfer are divided into three categories as follows: factor of family characteristics, factor of family economy and factor of resource endowment. The factors of the peasant family characteristics include the total family population (X_1), the total household workforce (X_2) and the ratio of migrant workers (X_3). The factors of family economy include the average annual income per capita (X_4), and the proportion of the cultivated land income in total income (X_5). Factors of resource endowment include the terrain of the cultivated land (X_6), the contracting area of the cultivated land per capita (X_7) and the fragmentation degree of the cultivated land (X_8). The description of each independent variable is shown in Table 1.

Data sources and sample characteristics

The Jiangxi province, located in the central China, is a traditional agricultural province and a major grain producing province with the cultivated land area of 2 859 000 ha. It consists mainly of hills and mountains and the distribution of the contracted cultivated lands is patchy. Therefore, land transferring is significant in promoting the cultivated land large scale operation. This is typical of the study in the Jiangxi province. In this research study, 74 villages in 64 townships, 42 counties, 10 cities (Nanchang, Ganzhou, Xinyu, Yichun, Ji'an, Pingxiang, Shangrao, Jiujiang, Fuzhou and Jingdezhen) in Jiangxi province are studied (Figure 1). There are five levels of local government in China. Arranged from the highest to the lowest, they are the province, prefecture, county, township, and village. The village serves as an organizational division and can consist of several villager groups. As far as the Jiangxi province is concerned, it is divided into 11 prefecture-level cities. For the selection of the survey spots selection, we considered the social economic index, such as the gross domestic product per capita of the county, the annual net income per capita of

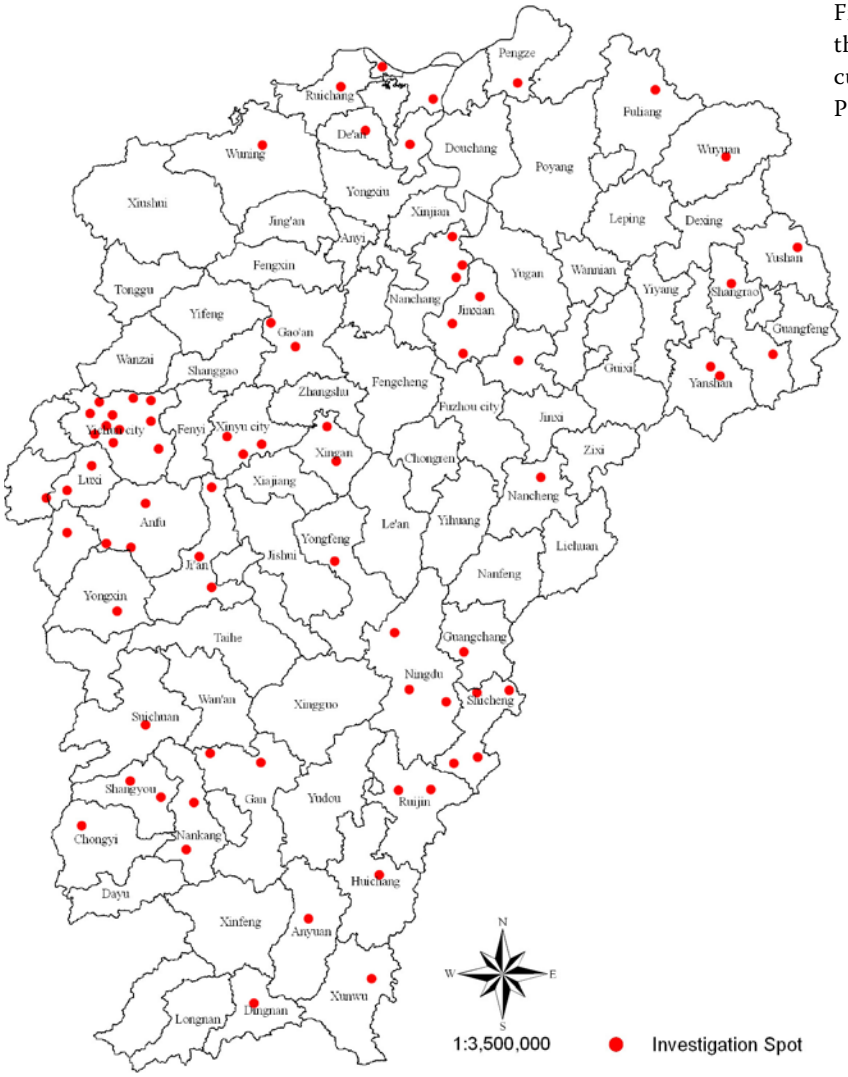

Figure 1. Typical spot distribution of the questionnaire investigation for the cultivated land transferring in the Jiangxi Province

the farm households and the difference of villages in combination of the areas of city and country and near the main road and the villages in remote and border areas. According to the terrain, 22.8% of sample villages are in plains, 49.5% are in hilly areas and 27.2% are in mountainous areas. In terms of economic conditions, in 11.2% the annual income per capita is more than 528 EUR (about 5 000 CNY), in 48.7%, it is from 317 to 528 EUR (about 3 000 to 5 000 CNY) and in 40.1%, it is less than 317 EUR (about 3 000 CNY), which represents the average level of the Jiangxi Province.

The investigation lasted half a year from the New Year's holiday to the summer holiday of 2006. To ensure a broad representation, the farm households interviewed include farm households farming at home, migrant workers returning for the New Year and migrant workers in the second and tertiary industries. The investigation was mainly through questionnaires in conjunction with interviews and mini-symposiums. There were three parts in the questionnaire: the first part was the basic situation of the farm households including the composition of the family, the amount of the contracted cultivated land, its distribution and the actual arable area, the total income of the family and the income from farming, and the gender, age and educational level of the farmer interviewed. The second part was the information of the cultivated land transferring out including 13 questions, such as the land transferring profits, transferring ages, the farming and transferring attitude and the reasons of transferring. In the third part, the information of the cultivated land transferring was included in the interviews with seven questions such as farming costs, the farming and transferring attitude and the causes of transferring in.

In the investigation, 1 500 questionnaires were given out and 1 396 valid questionnaires were returned. Of these, 775 farm households with the transferring behaviour accounting for 55.5% of the total, including 439 farm households with only transferring out, 323 farm households with only transferring in and 13 household with both in and out (Table 2). The total

Table 2. List of the cultivated land transferring

Samples (household)		Rate	
Have transferring behaviour	only transferring in	439	31.4%
	only transferring out	323	23.1%
	both transferring in and out	13	0.9%
	total	775	55.5%
No transferring behaviour		621	44.5%
Total		1 396	100.0%

cultivated land area contracted by farm households interviewed was 213.83 ha, including 82.57 ha of the cultivated land transferring, accounting for 38.6% of the total.

ANALYSIS OF THE FARM HOUSEHOLDS' ATTITUDE FOR THE CULTIVATED LAND TRANSFERRING

Analysis of the farm households' attitude for the cultivated land transferring out

Analysis of the farm households' decisive attitude for the cultivated land transferring out

To investigate the influencing factors of the attitude during the decision-making of the cultivated land transferring in, two questions were asked: (1) "when you are willing to farm all your arable land" (which means no transferring) and (2) "when you are willing to transfer out all your cultivated land" (which means totally transferring out). These questions were set to measure the attitude of farm households during the land transferring out. The selection of the cultivated land transferring out was set to measure the decisive attitude during the land transferring out.

The statistical data from the question "when you are willing to farm all your arable land" are shown in Table 3. Of all the options, migration work is still the first choice for most farm households and almost 50% of farm households will cultivate their lands totally when there is no migration work. Many farm households (29.2%) think that the rural products are too cheap to produce any profits. Farm households choosing "cultivated land can be a whole which is easy to plough with tractor" are least (24.1%). This is not because the farming mechanization cannot increase the efficiency but because the cultivated land per capita is so small that no great economic benefits will be obtained even if the cultivated lands became a whole and the farming mechanization was used. On the other hand, the total land per household is so small that having agricultural machines becomes an uneconomic behaviour and renting machines while harvesting will lessen the profit. During our investigation, we found that farm households chose "cultivated land can be a whole which is easy to tractor-ploughing" in the areas with more cultivated land per capita, which proves our analysis results indirectly.

Table 4 shows the statistical data for the question "when you are willing to transfer out all your cultivated land". Among all the options, only 24 farm households (5.2%) chose "(A) residence account in the city", 224 household (49.6%) chose "(B) having certain income residence account in the city", and 204 farm households (45.2%) chose "(C) can feed a family". Obviously, farm households do not value the residence accounts in the city. This is probably because of the increase of rural income and the fact that a citizen with a residence account in the city cannot obtain welfares as before. Though many farm households work in the city, the residence accounts in the city are not their main purpose but rather earning more money than in the countryside. Most

Table 3. The attitude to farm all cultivated land (units: household, %)

(A) no migration work	(B) the rural products price raising and there is profits by farming	(C) cultivated land can be a whole which is easy to tractor-ploughing	Total
211 (46.7%)	**132** (29.3%)	**109** (24.1%)	**452** (100.0%)

Table 4. The attitude for transferring out all cultivated land (units: household, %)

(A) residence account in the city	(B) having certain income residence account in the city	(C) can feed a family	Total
24 (5.2%)	**224** (49.6%)	**204** (45.2%)	**452** (100.0%)

Table 5. The selection of arable land transferring out (units: household, %)

(A) far from home	(B) infertility	(C) small in size	(D) do not care	Total
155 (34.3%)	**48** (10.8%)	**55** (12.1%)	**194** (42.8%)	**452** (100.0%)

farm households interviewed said that they would not settle down in the city with the hope of earning some money to build their own house.

In Table 5, it can be seen that most of the farm households (42.8%) selected "do not care" for "the selection of cultivated land transferring out" question; the second most popular choice was "far from home" (34.3%), and then "small size" (12.1%) and "infertility" (10.8%) for the land transferring out. This reveals that farm households have almost no requirement for the cultivated land transferring out. Even if there is some requirement, it is mainly considered farming convenience to transferring out land far from home. This is mainly because the farming profit is low and the demand for the cultivated land transferring in is not large at present. Therefore, farm households, which cultivated land on transfers in, have more choice, and they will generally choose a fertile cultivated land near their lands. Households that transfer arable land out have no other demand other than to avoid the land waste.

Analysis of farm households' attitude after the cultivated land transferring out

Farm households are also concerned about the cultivated land transferring out. Cultivated land transferring is not complete, and most of the land use rights are transferred temporarily and by a verbal agreement and a household may take them back at any time. Therefore, the questions about worry and hope after land transferring out were set to analyze the farm households' attitude after the cultivated land transferring out.

From Table 6, it can be seen that most of the households chose "no worry" after the land transferring out. This reveals that farm households have a little hope for cultivated land when its output is low, it is a spontaneous behaviour and there is no more supervision during the land transferring.

In the question "what your hope is after land transferring out" (Table 7), 95 farm households (21.2%) selected "(A) contracted cultivated land is expropriated and compensation is paid one time", 152 farm households (33.3%) selected "(B) good harvest" and 205 farm households (45.5%) selected "(C) do not care". In general, most of the farm households had no special hopes or just wished for a good harvest after the land transferring out. Meanwhile, the hope "contracted cultivated land is expropriated and compensation is paid one time," which only accounts for 21.2%, is also not the mainstream attitude.

Analysis of farm households' attitude for the cultivated land transferring in

Analysis of farm households' decisive attitude for the cultivated land transferring in

According to the analysis of the main reason for the cultivated land transferring in (Table 8), 101 farm households (39.2%) selected "(B) only can raise income by farming", 66 farm households (25.5%) selected "(C) more labour and less cultivated land" and "(D) to help others" and less than 10% selected "(A) large-scale production and mechanization" and "(E) be good at farming". This reveals that the main reason for land transferring in is the surplus rural labour or helping others.

Of all the factors considered by farm households regarding land transferring in (Table 9), 64.6% selected "(B) the quality and output of the cultivated land", 19.3% selected "(C) the rent" and 16.1% selected "(A) cultivated land can be a whole which is easy to tractor-ploughing". Obviously, in the view of farm households regarding land transferring in, the quality and output of the cultivated land is their main

Table 6. The worry after land transferring out (units: household, %)

(A) contracted cultivated land is expropriated and dispute over compensation happens	(B) no rent or grain obtained	(C) failure of harvest	(D) to adjust the contracted cultivated land	(E) no worry	Total
48 (10.5%)	**60** (13.2%)	**60** (13.2%)	**22** (4.9%)	**262** (58.1%)	**452** (100.0%)

Table 7. The hope after land transferring out (units: household, %)

(A) contracted cultivated land is expropriated and compensation is paid one time	(B) good harvest	(C) don't care	Total
95 (21.2%)	**152** (33.3%)	**205** (45.5%)	**452** (100.0%)

Table 8. The attitude for transferring in the cultivated land (units: household, %)

(A) large-scale production and mechanization	(B) only can raise income by farming	(C) more labour and less cultivated land	(D) to help others	(E) be good at farming	Total
23 (6.7%)	**132** (39.2%)	**86** (25.5%)	**86** (25.5%)	**9** (2.7%)	**336** (100.0%)

Table 9. The most important factor for the cultivated land transferring in (units: household, %)

(A) cultivated land can be a whole which are easy to tractor-ploughing	(B) the quality and output of the cultivated land	(C) the rent	Total
55 (16.1%)	**217** (64.6%)	**64** (19.3%)	**336** (100.0%)

selection factor but not the cultivated land being a whole or for rent. This is because the price of land transferring is sometimes a determined value in a certain area and in some places; land transferring often needs no money. Therefore, price is not the most important factor. Based on this point and the low popularizing rate of agricultural mechanization, the most important factor for farm households is the quality and output of the cultivated land.

Analysis of farm households' attitude after the cultivated land transferring in

Meanwhile, farm households involved in land transferring in accepted the incomplete transferring. After land transferring in, the worries included "(B) no market for rural products", accounting for 45.8% (118 farm households), then "(A) land transferor retake the land", accounting for 22.7% (58 farm households). Further, 41 farm households (15.9%) selected "(D) cannot master modern agricultural technology" and 40 farm households (15.6%) selected "(C) cultivated land is expropriated or contracted land is re-adjusted" (Table 10). During the investigation, we discovered that the marketing channel of rural products is narrow and grains are mainly sold to the state grain merchants except the grain rations at present, therefore, lacking a rural products selling agency. As shown in Table 11, after land transferring in, the hope of most farm households is "(C) rural products supportive policy" accounting for 49.4% (127 farm households) and then "(B) more investment in cultivated land infrastructure" at 23.6% (61 farm households), "(D) understand the rural product market timely" at 15.6% (40 farm households) and "(A) sign an agreement more than five years and obtain stable income" at 11.3% (29 farm households). Obviously, the greatest wish of the farm households is to get a supportive policy to increase the economic income of rural products. The agricultural income is low and often negative; therefore, more supportive policies for rural products and more investment in the cultivated land infrastructure are needed. Farm households have no economic means to invest to improve the agricultural infrastructure because of the low agricultural income.

FARMER BEHAVIOR OF THE CULTIVATED LAND TRANSFERRING AND THE ANALYSIS OF THE INFLUENCING FACTORS

Results

The logistic multiple regressions in the statistical software SPSS 12.0 were adopted to establish a model for the survey data. The following models were used:

(1) Comprehensive transfer model

Those which have transfer (including transfer-out, transfer-in and transfer-out-and-in) shall be considered as an establishment of the behaviour of

Table 10. The worry after the arable land transferring in (units: household, %)

(A) land transferor retake the land	(B) no market for rural products	(C) cultivated land is expropriated or contracted land is re-adjusted	(D) cannot master modern agricultural technology	Total
76 (22.7%)	**154** (45.8%)	**52** (15.6%)	**54** (15.9%)	**336** (100.0%)

Table 11. The hope after the arable land transferring in (units: household, %)

(A) sign an agreement more than five years and obtain stable income	(B) more investment in cultivated land infrastructure	(C) rural products supportive policy	(D) understand the rural product market timely	Total
38 (11.3%)	**80** (23.6%)	**166** (49.4%)	**52** (15.6%)	**336** (100.0%)

transfer and the dependent variable is assigned to be 1. The dependent variable of those which do not have transfer is assigned to be 0. Regression is carried out for all sample data.

(2) Transfer-out model

The assignment rule of the dependent variables is as follows: when a peasant family has the behaviour of the cultivated land transfer-out (including two categories of samples: pure transfer-out of cultivated land and transfer-out-and-in of cultivated land), the value assigned to the dependent variable is 1. When a peasant family does not have the behaviour of the cultivated land transfer, the value assigned to the dependent variable is 0.

(3) Transfer-in model

The assignment rule of dependent variables is as follows: when a peasant family has the behaviour of the cultivated land transfer-in (including two categories of samples: pure transfer-in of the cultivated land and transfer-out-and-in of the cultivated land), the value assigned to the dependent variable is 1. When a peasant family does not have the behaviour of the cultivated land transfer-in, the value assigned to the dependent variable is 0.

The results by adopting the above-mentioned method through the process of the logistic regression model are shown in Table 12.

Analysis of influencing factors of the family characteristics on the behaviour of the cultivated land transfer

Among all the factors of family characteristics, the factor of the total family population, the total agricultural workforce and the ratio of migrant workers all had different levels of influence on the behaviour of the cultivated land transfer. In the model of the comprehensive transfer and transfer-out, the influences of the total family population on the behaviour of transfer were significant ($P < 0.05$) and the regression coefficient was relatively great with a negative action direction. This indicates that the larger the total family population, the greater the demand for grain and the weaker the attitude of the cultivated land transfer-out. However, for the cultivated land transfer-in, even though the regression coefficient was greater than zero, it did not achieve the relevant notable levels. This indicates that the influence of

Table 12. Result of parameter estimation

Independent variable	Comprehensive transfer model			Transfer-out model			Transfer-in model		
	regression coefficient *b*	test value wald	ratio of occurrence exp(*b*)	regression coefficient *b*	test value wald	ratio of occurrence exp(*b*)	regression coefficient *b*	test value wald	ratio of occurrence exp(*b*)
Total family population	–0.144**	6.487	0.866	–0.159**	5.907	0.853	0.050	0.583	1.051
Total agricultural workforce	–0.142	2.221	0.868	–0.487***	12.835	0.614	0.191*	3.410	1.210
Ratio of migrant workers	1.830***	29.338	6.232	2.082***	24.449	8.021	–0.295	0.578	0.745
Average annual income per capita	0.033	1.488	1.034	0.076***	7.081	0.926	–0.105***	14.673	1.111
Proportion of cultivated land income	1.504***	30.384	4.501	–2.776***	48.606	0.062	3.697***	152.174	40.320
Terrain	0.588***	23.287	1.801	0.692***	23.995	1.998	0.099	0.543	1.105
Area of cultivated land per capita	0.128***	14.030	1.136	0.031**	5.743	1.032	–0.005	0.045	0.995
Fragmentation degree of cultivated land	–0.258**	4.910	0.773	0.130	1.516	1.138	–0.420**	5.730	0.657
Constant term	0.588***	13.233	0.256	–0.884*	3.693	0.413	–2.843***	43.425	0.058

Note: *, ** and *** reflect that the inspection is notable at the significant level of 10%, 5% and 1%, respectively

the total family population on the farmer behaviour of the cultivated land transfer-in is not obvious. The obvious rule does not exist that more land is cultivated in order to provide more grain due to a large population. The influence of the total agricultural workforce on the cultivated land transfer-out was negative and significant at the level of 1%, which indicated that the greater the workforce, the fewer possibilities of the cultivated land transfer-out there are. Furthermore, in the current rural production, as long as the workforce is sufficient, families tend to cultivate the land by themselves. However, its influence on the cultivated land transfer-in was positive and significant at the level of 10%. To some extent, the families with more labour force tend to cultivate more. Based on the analysis with the combination of the total family population and the total agricultural workforce, the influence of the population factor on the farmer behaviour of the cultivated land transfer-out was far greater than that on the farmer behaviour of the cultivated land transfer-in. The larger the total population or the greater the workforce, the greater the attitude of the cultivated land transfer-out, but the attitude of the transfer-in is not necessarily strong.

The significance of the ratio of migrant workers was high in the comprehensive model and the transfer-out model. The regression coefficient was large, especially in the model of the cultivated land transfer-out; it was significant at the level of 1%, which indicated that the influence of opportunities of the migrant work was very critical for the cultivated land transfer-out. The more opportunities of migrant work, the stronger the attitudes of the cultivated land transfer-out. This reflects that the benefit of the current cultivated land production was far less than that of the migrant work. Although the influence of the ratio of the migrant work on the cultivated land transfer-in was not significant at the level of 10%, it also indicated that the workforce of the families of the cultivated land transfer-in was basically for agricultural production at home, which coincides with the real life.

The analysis of influencing factors of family economy on the cultivated land transfer

Among the factors of family economy, the influence of the proportion of the cultivated land income was the most notable among all eight factors. It was significant at the level of 1% in the comprehensive transfer model, the transfer-out model and the transfer-in model and the value of the Wald test was large as well. Its regression coefficient was the largest in the transfer-out model and the transfer-in model. This indicates that the proportion of the cultivated land income is very important for the decision-making of the cultivated land transfer. This is in accordance with the influence of the ratio of migrant workers on the behaviour of transfer as analyzed above. The regression coefficient of the factor of ratio of the cultivated land income was positive 3.697 in the transfer-in model and negative 2.082 in the transfer-out model. The effect of the factor of the average annual income per capita on the decision-making of transfer was very significant in both the transfer-in model and the transfer-out model with the significance at the level of 1%. The lower the proportion of the cultivated land income and the higher the average annual income per capita, the more likely it is to have the cultivated land transfer-out; the higher the proportion of the cultivated land income and the lower the average annual income per capita, the more likely is the cultivated land transfer-in. The fact that after the cultivated land transfer-out, the rural workforce is mainly engaged in the non-agricultural production which results in the improvement of the annual income levels of the farm households. The agricultural farm households have, after the cultivated land transfer-in, more land to cultivate and they cannot engage in the non-agricultural production which results in the reduction of the annual income level of the farm households. Objectively speaking, the economic income and the cultivated land transfer are in the relationship of reciprocal causation. It is hard to distinguish which is the cause and which is the result. However, the investigation fully reflects that there is a trend that the economic income of the households of the cultivated land transfer-in is obviously lower than that of the households of the cultivated land transfer-out.

The influence analysis of factors of the resource endowment on the cultivated land transfer

The factors of the resource endowment, the terrain, the area of cultivated land per capita and the fragmentation degree of cultivated land all influence the different levels of decision-making on the cultivated land transfer. The influence of the terrain factor on the cultivated land transfer-out had the notably positive effect, and with the significance at the level of 1%, which indicates that the flatter the terrain and the easier the cultivated land connects to other land, the easier the cultivated land transfer-out. On the contrary, if the area is more hilly, the lower the chances of the cultivated land transfer-out. The reason may be that as the cultivated land is fragmented, no one would like to take the cultivated land transfer-in. This can be proved to some extent by the influence of the fragmentation degree of cultivated land on cultivated land

transfer-in. The influence of fragmentation degree of the cultivated land on the cultivated land transfer-in is notably negative effect, with the significance at the level of 5%, which indicates that the smaller the area and the more scattered the cultivated land, the less likely the farm households of the cultivated land transfer-in take the land. The effect of the area of cultivated land per capita is positive in the comprehensive transfer model and the transfer-out model, which indicates that the larger the area of the cultivated land per capita, the more likely is the cultivated land transfer-out. It can be explained by the guarantee function of cultivated land (Chen et al. 2006). At present, one of the basic functions of the cultivated land is to meet the demand of grains instead of earning economic profit by planting grains. The agricultural household with an excessive land after satisfying the demand will be more likely to transfer land. However, the influence of the area of the cultivated land per capita is not obvious in the transfer-in model.

CONCLUSIONS

By analyzing the attitudes of farm households for the cultivated land transfer-out and transfer-in, at present, the farmer cultivated land transfer has not been flourishing. Particularly, there is a weak driving force of the cultivated land transfer-in mainly because of the small economic benefit of the cultivated land operation. In order to enhance the speed and extent of the cultivated land transfer, to improve the utilization efficiency of the scarce resources of the cultivated land and to solve the contradiction between the overly decentralized operation of the cultivated land and agricultural modernization, an endeavour must be carried out to improve the economic benefit of the cultivated land production of farm households. On one hand, the support dynamics for agriculture shall be further enhanced, especially by strengthening the public input for the cultivated land infrastructure and optimizing the production environment of the cultivated land to share the productive cost of the cultivated land operators. On the other hand, the price of agricultural products should be stabilized to ensure the productive profit which the cultivated land operators deserve. At the same time, the shift of rural workforce should be accelerated. Of 439 surveyed farm households with pure transfer-out, 208 farm households expressed their willingness of transferring out the contracting cultivated land as long as there was the opportunity of working in the cities. This shows the importance of the shift of rural workforce in the cultivated land transfer.

From the analysis, it can be seen that the farmer behaviour of the cultivated land transfer is under the influence of many factors, such as the family characteristics, the family economy and the resource endowment. However, the action directions and the degrees of influence of various factors differ. The higher the total family population and the total agricultural population, the more likely it is to have the cultivated land transfer-in. The more non-agricultural working opportunities, the stronger the attitudes of the cultivated land transfer-out. The improvement of the average annual income per capita and the proportion of the non-agricultural income are good for the cultivated land transfer. The complicated terrain, the fragmented land and the reduction of the area of the cultivated land per capita are detrimental for the cultivated land transfer. Therefore, to stimulate the enthusiasm of the farmer for the cultivated land transfer, the transfer of agricultural workforce should be accelerated. By developing the second and third industry and optimizing the policy environment for working and the business conducted by farm households in cities, more farm households are encouraged to engage in non-agricultural production to increase the driving source of cultivated land transfer-out. Secondly, the support dynamism for agriculture households could be further strengthened to develop rural economy and to guarantee and improve the economic benefit of the cultivated land production and, then, to enhance the initiative of farm households of the cultivated land transfer-in. Thirdly, the distribution type of contracting land should be improved and perfected to decrease the degree of the artificial fragmentation of the cultivated land areas as much as possible to make the land appropriate for the mechanized scale operation to promote the cultivated land transfer.

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REFERENCE

Awasthi M.K. (2009): Dynamics and resource use efficiency of agricultural land sales and rental market in India. Land Use Policy, *26*: 736–743.

Chen M.-q., Liu Z.-t., Zhou B.-j. (2006): Empirical analysis of the survival and development of the rural environment and the farm households' use of cultivated land. Chinese Rural Economy, *2*: 49–54.

Chen M.-q., Deng A.-z., Zhou B.-j. et al. (2005): An empirical study on farm households' feelings among different groups on cultivated land protection. China Soft Science, *9*: 50–56

Deininger K., Zegarra E., Lavadenz I. (2003): Determinants and impacts of rural land market activity: Evidence from Nicaragua. World Development, *31*: 1385–1404.

Doucha T., Divila E. (2005): Possible impacts of the Czech agricultural policy after the EU accession on the land market and land usage. Agricultural Economics – Czech, *51*: 185–193.

Du W.-x., Huang X.-j. (2005): Regional difference and influencing factors of farm households' willingness of rural land transmission: A case study of Shanghai, Nanjing, Taizhou and Yangzhou cities in Yangtze-Delta Region. Resource Science, *27*: 90–94.

Huang Y., Huang X.-j. (2005): Study on factors influencing women's decision-making in farmland transfer – a case study of sample villages in Taizhou of Jiangsu Province. China Land Science, *19*: 12–15.

Hudečková H., Lošťák M. (2002): Czech farmers facing agricultural policy in the period of revitalization. Agricultural Economics – Czech, *48*: 233–243.

Kung J.K.-s. (2002): Off-farm labor markets and the emergence of land rental markets in rural China. Journal of Comparative Economics, *30*: 395–414.

Latruffe L., Doucha T., Le Mouel C., Medonos T., Voltr V. (2008): Capitalisation of the government support in agricultural land prices in the Czech Republic. Agricultural Economics – Czech, *54*: 451–460.

Lerman Z., Shagaida N. (2007): Land policies and agricultural land markets in Russia. Land Use Policy, *24*: 14–23.

Lin Y.-f. (1994): The major problem and prospect of Chinese rural innovation in 1990s. Management World, *3*: 139–144.

Lošťák M., Hudečková H., Rikoon S. (1999): Land ownership and the challenge of late modernity (new institutional settings and behaviour of Czech landowners). Agricultural Economics – Czech, *45*: 481–490.

LU W.-d. (2006): SPSS for Windows Statistical Analysis. Electronics Industry press, Beijing.

Ma X.-h., Cui H.-z. (2002): Establishing land transfer system, and promoting regional agriculture scale operation. Management World, *11*: 63–77.

Noev N. (2008): Contracts and rental behavior in the Bulgarian land market. Eastern European Economics, *46*: 43–74.

Qian W.-r. (2003): An analysis of the government function in the market-based circulation of agricultural land – a case study of farm households' conducts in Haining and Fenghua Zhejiang Province. Journal of Zhejiang University (Humanities and Social Sciences), *33*: 154–160.

Qian Z.-h. (2002): Incomplete property right of rural land contractual management right and it's predicament in market circulation: theoretical and policy analysis. Management World, *6*: 35–38.

Ru W.-d. (2006): SPSS for Windows Statistical Analysis. Electronics Industry Press, Beijing.

Tan S., Heerink N., Qu F. (2006): Land fragmentation and its driving forces in China. Land Use Policy, *23*: 272–285.

Tan S., Qu F., Huang X. (2001): Difference of farm households' land use decision making and land conservation policies under market economy. Journal of Nanjing Agricultural University, *24*: 104–110.

Tan S., Qu F., Heerink N. (2003): Analysis of land fragmentation and it's contributing factors. China Rural Survey, *6*: 24–30.

Teklu T., Lemi A. (2004): Factors affecting entry and intensity in informal rental land markets in Southern Ethiopian highlands. Agricultural Economics, *30:* 117–128.

Vranken L., Swinnen J. (2006): Land rental markets in transition: Theory and evidence from Hungary. World Development, *34:* 481–500.

Wegren S.K. (2003): Why rural Russians participate in the land market: Socio-economic factors. Post-Communist Economies, *15:* 483–501.

Wu J.-q. (2002): Study on Farmer's behavior in Farmland Transfer. [MS Dissertation.] Zhejiang University, Hangzhou.

Yao Y. (2000): The development of the land lease market in rural China. Land Economics, *76:* 252–266.

Zaibet L.T., Dunn E.G. (1998): Land tenure, farm size, and rural market participation in developing countries: The case of the Tunisian olive sector. Economic Development and Cultural Change, *46:* 831–848.

Zhang W., Makeham J. (1992): Recent developments in the market for rural land use in China. Land Economics, *68*: 139–162.

Zhang Q.F., Ma Q.G., Xu X. (2004): Development of land rental markets in rural Zhejiang: Growth of off-farm jobs and institution building. China Quarterly, *180*: 1050–1072.

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