The effect of off-farm employment on the decisions of households to rent out and rent in cultivated land in China

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Abstract

Purpose – Developing nations need good cultivated land rental markets to foster rational resource use and to enhance productivity and equity. Can cultivated land rental markets emerge in the face of rapidly developing off-farm labor markets? The purpose of this paper is to measure the correlation between the emergence of off-farm employment and cultivated land rental in China.

Design/methodology/approach – Based on a panel data from 2000 and 2008, the authors constructed econometric models to identify the impact of off-farm employment on the decisions of households to rent out and rent in cultivated land.

Findings – This paper finds that the emergence of off-farm employment has significant and positive impacts on stimulating household to rent out cultivated land. The effect is less prominent for renting-in decisions.

Originality/value – The paper empirically estimates the impacts of off-farm employment on cultivated land rent markets based on a unique panel data set from a national representative sample.

Keywords China, Agriculture, Land, Off-farm employment, Cultivated land rental market

Paper type Research paper

1. Introduction

In rapidly developing countries the transfer of land rights from those who move to the non-farm sector to those who continue farming is critically important for successful industrialization and for the structural transformation of the agriculture sector. If land markets are inefficient, retiring farmers cannot liquidate their land assets and the remaining farmers cannot expand their farm sizes to earn levels of income comparable to the levels of income that are earned by those in the off-farm sector. In post-war Japan

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poorly functioning land rental markets due to rent controls and other government interventions is one of the major causes of the persistence of small scale, inefficient, part-time farming (Hayami, 1988; Otsuka, 1992). Thus, the development of well-functioning land markets should be an important policy goal to mitigate inter-sectoral income disparities that can cause problems for emerging middle-income countries.

It is known that if one factor market (that is a market for farm labor, land sales, or land rental) functions competitively under the assumption of constant returns to scale, efficient resource allocation can be achieved (Kevane, 1996). Owing to high monitoring costs of farm work, farm labor markets are thin and the use of the hired labor is confined to simple tasks (Hayami and Otsuka, 1993). Care-intensive activities, such as water management and fertilizer application, are carried out only by family labor almost without exception. Land sales markets are not expected to function competitively as a mean of land reallocation across households because of the imperfect credit markets. Moreover, because land can be used not only for farming but also as collateral to receive a formal credit, the market price of land is often higher than the present value of future agricultural profits that accrue to land making it difficult to finance the cost of land purchase (Binswanger and Rosenzweig, 1986). Thus, among these factor markets, land rental market may be the most common way of reallocating resources efficiently across farm households (Otsuka, 2007).

Have cultivated land markets in China begun emerging? After coming out of the commune period in the early 1980s, the next two decades saw China's small farm-based agricultural economy change from one in which resources were allocated by planners to one in which markets played a major role. Commodity, input and off-farm labor markets have been shown to have gradually developed and led to higher efficiency and welfare gains for the rural population (Rosen et al., 2004).

Rental markets for cultivated land also appeared – although their appearance was most evident in the late 1990s. In the late 1980s and early 1990s few farmers engaged in cultivated land rental activities (Turner et al., 1998; Brandt et al., 2004; Deininger and Jin, 2005); however, after the mid-1990s, land rental activities expanded rapidly. According a national study by the China National Statistical Bureau in 2001, 9.5 percent of households nationwide rented land in. Most of the rental contracts during this time period were oral, informal and often seasonal (or at most annual) in nature.

Inside China – a country that through its 1980 reforms created an agricultural economy based on 200 million farms each with fewer than 0.5 ha – leaders have consistently encouraged cultivated land rental transactions. Land rental is one of the main ways in which operational land holdings are supposed to be expanded (Cai et al., 2008). Policy documents clearly state that farmers should strive to rent land in order to increase farm size, raise farming efficiency and generate higher labor productivity (that is, output per laborer). Among the different policy pronouncements, the directives of the late 1990s that extended household contracts until the late 2020s and the Cultivated Land Contracting Law of 2003 spelled out the intentions of China's top leaders: cultivated land rental would play an important role in China's agricultural development strategy (Wen, 2010).

Despite the government's well-intentioned policies, in China (as in other developing economies) it often is economic forces that have the greatest impact on the emergence of markets. Specifically, the rise of off-farm labor markets may be one of the institutions that can help launch cultivated land rental markets. The "East Asian Miracle"

is generally regarded as one of the most successful development paradigms in the twentieth century. Following this pattern, Japan, Korea and Taiwan experienced a rapid transformation from a rural into an urban society based on industry rather than agriculture. The rise of off-farm employment is one of the most salient characteristics of East Asian countries during their early periods of development. During their "takeoff periods" large fractions of the rural populations in these East Asian nations moved off the farm into urban manufacturing jobs, fueling sharp rises in productivity and incomes. Almost as important, during their industrialization and urbanization phases leaders were able to reduce poverty among those left in rural areas and maintain a healthy agricultural sector, thereby attenuating trends towards increased inequality (Johnston and Mellor, 1961; The World Bank, 1993). One of the key parts of the package of policies and institutions that allowed the agricultural sector to stay healthy as off-farm employment rose was the appearance of cultivated land rental markets.

In many ways China's path of development during the past two decades has been similar to what was followed by Japan, Korea and Taiwan. Starting with a largely rural population, engaged in farming, many rural residents have reoriented their livelihood strategies. Off-farm work has emerged as a main source of income growth for many rural households (Lohmar, 1999; Kung, 2002). Up to 100 million migrants reside outside of their home villages. Family-owned businesses and privately run factories provide increasing employment opportunities in rural areas. To an extent never experienced before, young and better-educated workers moved to cities while their remittances or the assets they brought back upon their return contributed to rising rural incomes and standards of living (de Brauw *et al.*, 2002; Li *et al.*, 2010).

There are studies that have focused on the impact of off-farm employment on the development of cultivated land rental market. For instance, Yao (2000) concluded that a market with a heterogeneous population and a labor force that could freely move would lead to the emergence of a cultivated land rental market. Other studies also have raised the possibility that off-farm employment would accelerate the development of cultivated land rental markets (Deininger and Jin, 2005; Li *et al.*, 2009; Zhong and Ji, 2009).

Unfortunately, many of the empirical studies have shortcomings. The data used by some are often limited to only several provinces or smaller geographic areas. Others are out of date. Therefore, we believe that it is important to understand the interactions between off-farm employment and cultivated land rent markets and analyze the impact of off-farm employment on the emergence of cultivated land rental markets using a dataset that is more recent and that is national representative.

The overall goal of this paper is to have a better understanding of the impact of rising off-farm employment on cultivated land rental markets. To achieve this goal, the rest of paper is organized as follows. The next two sections describe the dataset and use the data to show the status of cultivated land rental markets in China. Using descriptive statistics we examine if there is any correlation between off-farm employment and cultivate land rental market activity. The fourth and fifth sections develop an econometric model and use it to analyze the impact of off-farm employment on cultivated land renting-out and renting-in. The final section concludes.

2. Data
The data used in this study are a subset of a dataset that was collected during two rounds of nationwide surveys. The surveys were carried out by the authors in December 2000

(collecting data for the year 2000) and early 2009 (collecting data for the year 2008). The dataset for the year 2000 includes information from 60 randomly selected villages in six provinces representing China's major agricultural regions. The provinces selected include Hebei, Liaoning, Shaanxi, Zhejiang, Sichuan and Hubei. A total of 1,200 households were investigated. For each province five counties were selected. Two villages were randomly selected from each county. A total of 20 households were chosen from each village. Among the 1,200 households' records, 1,189 records had complete information. In 2000 exactly 11 (out of 1,189) households were not engaged in farming.

In the 2009 survey we went back to the same villages that were surveyed in 2000. There were two exceptions. Because two of the villages in Sichuan were in the earthquake-damaged areas of Sichuan, we were not able to do the survey in the villages. Therefore, the sample size was reduced from 2,000 to 1,160. Among the remaining 1,160 households surveyed in 2000, we were able to re-investigate 1,046 households in 2009. Of the 114 households that we could not find in the village, 89 of them had moved out of the village and resided in an urban area. The other 25 households either disappeared because all of the members had died (seven households) or were living in the village but were not engaged in farming activities (18 households – mostly because they were too sick or too elderly to farm).

Using the 1,046 households surveyed, we constructed a true panel dataset. Among 1,046 households surveyed, however, not all households could be part of the panel. There were some households that "split" into two or more separate households between 2000 and 2008 (due to marriage or other reasons). During the data collection effort in 2000, for some reason a number of other households did not fully complete their employment histories (which meant that we did not know their off-farm employment status for the years which were used to create the seven year lagged employment variable – one of our key independent variables of interest). In the end, we were able to create a panel dataset that included 836 households that could be used in the study (Table I). In the case where our variables created with data that are measured in value terms, we put them into real 2000 yuan terms using the Rural Consumer Price Index from the *China Statistical Yearbook* (China National Statistical Bureau, 2009).

3. Off-farm employment and cultivated land rental market

A summary of cultivated land rental land is provided in Table I and the rise in cultivated land rental activity is clear. In 2000, among the 836 households included in our panel dataset, 69 households (or 8.3 percent of the households) rented-out land. By 2008 the same set of households rented-out 17.2 percent of their cultivated land (144 out of 836 – column two, Table I). Interestingly, also for this same set of 836 households, the share of households that were renting-in cultivated land increased only slightly between

	Total	Rented-out	Rented-in
2000	836	69 (8.3)	130 (15.6)
2008	836	144 (17.2)	144 (17.2)
Sum	1,672	213 (12.7)	274 (16.4)

Note: The numbers in parentheses are percentage of the sample with rented-out or rented-in land
Source: Authors' surveys in 2000 and 2009

Table I.
The number of households that participated in cultivated land rental markets in 2000 and 2008

2000 and 2008 (column three). One explanation for this observation is provided by Gao *et al.* (2011) which shows that the average size of rented-in land per household has been increasing in the past decade. This is also true for our survey households.

As seen in the introduction, the literature has shown that the emergence of cultivated land rental markets is associated with a number of economic and social forces, including the rise of off-farm labor markets (Nabi, 1985; Deininger and Feder, 2001; Kung, 2002; Deininger and Jin, 2007). In the case of China, where both access to off-farm employment and the level of the wage is rising (de Brauw *et al.*, 2002), it is possible that the rise of off-farm employment is one of the forces that has been driving the rise of cultivated land rental. When farmers are able to earn substantially more off the farm, they begin to consider ways to rent out their land to those that have less of an opportunity to work off the farm (or to those that are relatively better at farming).

Table II provides evidence of the interaction between cultivated land rental markets and off-farm employment. In this table we divide cultivated land rental activities of households into renting-out and renting-in activities. The data are also provided by year and by province. In the case of household off-farm employment activities, we divide our observations into the off-farm activities of household heads and the off-farm activities of other family members.

Table II shows the correlation between the rising trend of households that rented-out cultivated land between 2000 and 2008 (column one) and the increases in off-farm employment, both that of the household head (column three) and that of the other family members (column four). Specifically, as the share of off-farm employment of the household head (other family members) rose from 21 percent (33 percent) in 2000 to 41 percent (89 percent) in 2008, the share of cultivated land that was rented-out rose from 8.3 to 17.2 percent (rows one and eight).

This correlation can also be found in the case of every province (Table II, rows two to seven; rows nine to 14). In both 2000 and 2008 the data demonstrate that provinces with more off-farm employment are positively correlated with the share of households that

	Percentage of households with rented-out land	Percentage of households with rented-in land	Household head with off-farm job (0 – no, 1 – yes)	Number of family members (excluding household head) with off-farm job
2000	8.3	15.6	0.21	0.32
Zhejiang	19.9	31.3	0.24	0.49
Hebei	10.6	15.5	0.25	0.33
Hubei	7.3	19.7	0.21	0.29
Sichuan	4.6	8.6	0.17	0.28
Liaoning	4.2	11.2	0.22	0.34
Shaanxi	2.7	7.1	0.12	0.18
2008	17.2	17.2	0.41	0.89
Zhejiang	34.4	21.4	0.60	1.44
Liaoning	21.4	13.9	0.44	0.89
Hebei	17.9	24.5	0.48	1.11
Hubei	15.0	25.7	0.30	0.59
Shaanxi	10.6	13.7	0.32	0.67
Sichuan	5.6	6.3	0.34	0.66

Source: Authors' surveys in 2000 and 2009

Table II.
Cultivated land rental activity and off-farm employment in China and by province in 2000 and 2008

rent out their cultivated land (comparing column one with columns three and four). Perhaps, because of the more moderate rise of households that rent in land (column two), there is not a strongly correlation between the share of households that rent in cultivated land and the share of households with off-farm employment (columns three and four). It appears as if as more and more households move off the farm (and rent their land out), the share of households renting-in land is not increasing, although households that are renting-in cultivated land are increasing the size of their rented-in cultivated land.

The relationship between households with rented-out land and off-farm employment is even more obvious when we divide our sample by the type of household member. In 2000 when the head of the household worked in the off-farm employment market (Table III, column two), households tended to have a higher probability of renting-out their cultivated land (10.5 percent, row one) than in the case in which the head of the household was not working off the farm (7.7 percent, row two). The same relationship (21.7 for households in which the household head worked off the farm; 14.1 for households in which the household head did not work off the farm) was also observed in 2008 (column five, rows one and two). Moreover, when we divide our sample into households in which other (non-household head) family members do and do not have

		2000 Percentage of households with			2008 Percentage of households with	
	Sample	Rented-out	Rented-in	Sample	Rented-out	Rented-in
Household head had off-farm job						
Yes	172	10.5	12.8	345	21.7	17.1
No	664	7.7	16.3	491	14.1	17.3
Other family member had off-farm job						
Yes	211	10.4	11.8	499	19.4	17.8
No	625	7.5	16.8	337	14.0	16.3
Number of family members in the labor force						
≤1	24	20.8	16.7	61	32.7	14.8
[2,3]	609	8.2	16.1	570	17.4	17.1
≥4	203	6.9	13.7	205	12.2	18.1
Own cultivated land						
≤0.2 ha	235	10.6	21.3	289	16.3	21.5
[0.2, 0.5 ha]	380	6.8	11.8	336	19.4	13.7
>0.5 ha	221	8.1	15.8	211	15.1	17.1
Ag_Equipment (yuan/ha [a])						
= 0	111	18.0	12.6	168	38.7	7.1
(0, 500]	163	7.4	8.6	128	21.8	15.6
(500, 5,000]	338	6.8	15.4	241	10.3	24.1
>5,000	224	6.3	22.3	299	8.7	18.1
Wealth (per capita assets) [a]						
≤3,000 yuan	396	4.8	13.4	166	15.1	13.9
(3,000, 10,000 yuan]	274	8.0	18.6	222	14.9	17.6
>10,000 yuan	166	16.9	15.7	448	19.2	18.3

Note: [a]All variables that are in value terms were put into real 2000 yuan terms using the Rural Consumer Price Index from the *China Statistical Yearbook* (China National Statistical Bureau, 2009)
Source: Authors' surveys in 2000 and 2009

Table III.
Characteristics of households and the share of cultivated land that is rented-in and rented-out among sample households in rural China in 2000 and 2008

off-farm employment, the correlation between rented-out land and off-farm employment still holds in both 2000 (column two, rows three and four) and 2008 (column five, rows three and four).

In contrast to the case of the relationship rented-out cultivated land and off-farm employment (and similar to the evidence found in Table II), Table III shows that off-farm employment is not closely related with rented-in land activities. In fact, in 2000 there was a weakly negative correlation between off-farm employment and rented-in land (column three) – although this relationship disappears in 2008 (column six). As discussed above, the neutral relationship between renting-in activities and off-farm employment appears to be the result of three trends:

(1) more and more people moving off the farm;

(2) more and more households renting their land out; and

(3) a shrinking cohort of those remaining in the village that are renting-in relatively more land (per household).

4. Multivariate analysis
In this section there are two subsections. The first defines the econometric model. The second discusses our approach to estimating the model. The next section reports the results of the multivariate analysis.

4.1 Econometric model
In order to estimate the effect of off-farm employment on cultivated land rental markets, we specify the following empirical model:

$$R\_out_{it} = a_1 + b_1 Head\_OF_{it-j} + c_1 Other\_OF_{it-j} + g(Zit) + u_{it} \qquad (1)$$

$$R\_in_{it} = \alpha_2 + b_2 Head\_OF_{it-j} + c_2 Other\_OF_{it-j} + h(Zit) + e_{it} \qquad (2)$$

In equations (1) and (2), subscript i represents the ith household and t represents the tth year. In our analysis that uses a panel dataset with two years of data t either is equal to 2000 or 2008.

Equations (1) and (2) are specified in order to be able to identify the determinants of renting-out and renting-in behavior. In equation (1) the dependent variable is a dummy variable, R_out. The variable equals 1 if the household is renting-out cultivated land and is equal to 0 otherwise. In equation (2) the dependent variable is also a dummy variable, R_in, but in this case is equal to 1 if the household is renting-in cultivated land and is equal to 0 otherwise.

The main explanatory variables of interest in equations (1) and (2) are $Head\_OF_{it-j}$ and $Other\_OF_{it-j}$. These two variables are the variables that measure the extent of the rise of off-farm activity of each household. The first of these, $Head\_OF_{it-j}$, is a dummy variable that equals 1 if the household head has an off-farm job in year $t-j$, where $j=7$. If the household head did not have an off-farm job in year $t-j$ the variable, $Head\_OF_{it-j}$, equals 0. The other variable, $Other\_OF$, represents the number of family members (excluding the household head) which has an off-farm job in year $t-j$. The value of $Other\_OF$ ranges between 0 and 5.

The use of a lagged independent variable of interest is done as a way to control for an unobserved heterogeneity (simultaneity). In other words, we lag both $Head\_OF$ and $Other\_OF$ in order to avoid any bias in our variable due to endogeneity. We chose to lag

the variables by seven years because we have data on off-farm employment for the households from the 2008 wave of the panel data for 2001 and we have data on off-farm employment for households from the 2001 wave of the panel data for 1993. Using household-level data, we expect that b_1 and b_2 will be positive since we expect that those households that have either their household head or other family members working off the farm will decide to rent out their cultivated land relatively more. At the same time, c_1 and c_2 are expected to be negative. When households have a high share of their family members working off the farm, it should lead them to lower the possibility of renting-in cultivated land. However, it is possible that as the share of people that work off the farm rises, there are fewer households that rent in land (though they may rent in relatively more land per household). In this case, it is plausible that the coefficients, c_1 and c_2, are 0.

Equations (1) and (2) also include a vector of control variables, Z, to account for impacts of other factors on the household's cultivated land rental decisions. In this study, Z includes the five factors: the size of the household labor force, measured as the number of all members of the family that are in the labor force (able-bodied, not in school and between 16 and 65 years old – family labor); the household's own cultivated land holdings (which is mostly land contracted to the household from the village) excluding rented-in land (own cultivated land in hectares); the value of the household's assets that can be used in agricultural production (measured as the value of agricultural equipment normalized by the by the of the household's own cultivated land holdings (*ag_equipment*)[1]; and the household's wealth (*wealth*). The *wealth* variable is measured as a sum of value of the durable consumption-side assets on a per family member basis. We expect that, holding other effects constant, households with more family labor are less likely to rent out their cultivated land (rows five to seven, Table III). Interestingly, Table III also shows that households with higher values of agricultural production assets have higher levels of rented-in cultivated land (rows 11-14).

The u and e in equations (1) and (2) are the disturbance terms. They are assumed to be distributed normally and iid. The detailed definitions and statistical descriptions of all variables used in regression are summarized in the Appendix.

4.2 Estimation approach
According to nature of the way that our variables are created, we use the following estimation methods. First, we estimate equations (1) and (2) using a Probit model. To better control for the characteristics of each county in the Probit model estimations of equations (1) and (2) we also include county dummy variables. The results are presented in columns one and two in Table IV.

Second, to control for the characteristics of households, or the unobservable effects of households, we also use an ordinary least squares with fixed-effect (OLS-FE) estimation[2]. When doing so all non-time varying unobserved effects that affect cultivated land rental are controlled for. This approach is used to estimate both equations (1) and (2). The results are presented in columns three and four in Table IV.

5. Results of multivariate analysis
The results from the estimated equations show that our approach performed well (Table IV). Specifically, the goodness of fit statistics (Adjusted R^2) range from between 0.23 for the basic OLS-version of the Probit equation for renting-out and 0.12 for

	Probit[a]				OLS-FE			
	Rented-out		Rented-in		Rented-out		Rented-in	
$Head\_OF_{t-j}$	0.03*	(0.02)	−0.03	(0.02)	0.06**	(0.02)	−0.04	(0.03)
$Other\_OF_{t-j}$	0.04***	(0.01)	−0.01	(0.02)	0.05**	(0.02)	0.03	(0.02)
Family labors	−0.04***	(0.01)	0.01	(0.01)	−0.02*	(0.01)	−0.01	(0.01)
Own cultivated land (ha)	0.03**	(0.01)	−0.05***	(0.02)	0.02	(0.02)	−0.10***	(0.03)
Ag_Equipment (yuan/ha)	−0.01***	(0.00)	0.01***	(0.00)	−0.01***	(0.00)	0.01***	(0.00)
Wealth (yuan/person)	0.01**	(0.01)	0.01	(0.01)	0.01*	(0.01)	0.01	(0.01)
Constant					0.06	(0.08)	0.22*	(0.09)
R^2	0.23		0.12		0.09		0.04	
F-value	286.0		185.0		13.9		5.9	
Prob. > F	0.00		0.00		0.00		0.00	

Notes: Statistically significant at: *10, **5 and ***1 percent, respectively; all numbers in parentheses are robust standard errors; [a]the marginal effects are estimated by the Probit model, so there are not county dummy variables

renting-in (columns one and two, row eight). This level of an Adjusted R^2 statistics is not low for regressions that examine economic activities, such as cultivated land rental.

A number of the coefficients on the control variables also performed as expected and are of interest in their own right (even though they are not the main focus of this study). For example, the estimated coefficients of the own cultivated land variable is positive (and significant) in the renting-out equation and negative (and significant) in the Probit versions of the renting-in equation (Table IV, columns one and two, row four). A family's cultivated land endowment, as expected, is a determinant of cultivated land rental. The estimated coefficient on the agricultural equipment variable also shows that access to farm equipment discourages households from renting-out their cultivated land (negative and significant sign in the renting-out equation) and encourages rental in (the positive and significant sign in the renting-in equation – columns one and two, row five). The signs and levels of significance are almost the same for OLS-FEs equations for both the own cultivated land variable and the *Ag_Equipment* variable (columns three and four, rows four and five).

When examining the effect of the independent variable of interest (off-farm employment) on cultivated rental market activity, the results of the estimation efforts are remarkably strong and robust. First, no matter what estimation method is used, it is consistently observed that both *Head_OF* (which measures whether the head of the household had an off-farm job seven years ago) and *Other_OF* (which measures whether any other family member besides the household head household had an off-farm job seven years ago) have significant and positive impacts on a household's decision to rent out their cultivated land (Table IV, columns one and three, row one). When using the results from the Probit estimations we can see that, everything held equal, if a household head was participating in the off-farm employment market, the probability that a household would rent out their cultivate land was increased by 3 percentage points (row one and column one, Table IV).

While it may be a concern that part of the finding from the Probit estimates in Table IV, column one is due to some observables at the household level (or above) that is correlated with both off-farm employment and cultivated land rental, the result remains when we included household fixed effects. In fact, the impacts become somewhat more

significant when we use the OLS-FE estimation approach. Specifically, the estimated parameter for *Head_OF* doubles (0.06, column three, row one). This finding is consistent with the point made by Deininger and Jin (2008) when they conducted a similar study in Vietnam. When controlling for household unobservables, we find even more clearly that cultivated land rental by households rises as off-farm employment (of the household head) increases.

This same estimation-effect is found in the estimation of the relationship between the off-farm employment of other family members and cultivated land rental activity (Table IV, columns one and three, row two). When using Probit (column one), holding other things constant, we find that when family members move off the farm, the probability of renting-out the family's land rises by 4 percentage points. When using the OLS-FEs approach, the measured effect size rises to 5 percentage points (and is also significant). One of the methodological lessons of our work that can be seen from moving from the Probit model to the OLS-FE model is that it is important to account for the unobservables when analyzing the relationship between family activities in two markets, in this case off-farm labor and cultivated land rental.

Similar to the descriptive analyses presented in previous section, both *Head_OF* and *Other_OF* do not have any significant impact on the household's decision to rent in cultivated land. Given the results from rented-out equations (columns one and three, Table IV), that is, the number of households that rented-out cultivated land increases with the rise of off-farm employment, the interpretation of insignificant impact of off-farm employment on the rented-in decision (or number of households to rented-in land) suggests that rented-out cultivated land has been moved to the same number of households that had rented-in land in the past. In other words, there appears to be an asymmetric impact of off-farm employment on a household's decision to rent land out or rent land in.

The results in Table IV further show that one other factor (related to labor and land endowments) also plays an important role in the household decision to participate in cultivate land rental markets. Specifically, holding other factors unchanged, when a family has a larger number of members in the labor force (family labors) there is a negative impact on the household's decision to rent out land (row three, Table IV). This, of course, is also expected given the fact that households with more family members will have more labor with which to cultivate their own land (given off-farm employment held constant).

6. Conclusions

This paper analyzes the impacts of off-farm employment (and several other factors) on the emergence of cultivated land rental markets. Using a unique, nationwide set of household-level panel data, the results show that off-farm labor markets and cultivated land rental markets are highly correlated. In particular, off-farm employment appears to be able to significantly encourage rural households to rent cultivated land out. This is potentially an important finding for policy makers that are concerned with equity and welfare for those that are left in the village. The result on renting-out (and its conclusions) is reinforced by the measured relationship between off-farm employment and the decision to rent cultivated land in. Although the relationship between off-farm employment and renting-in cultivated land is not significant, it is likely this means that those that are staying in the village are renting-in land are farming more land

(the rented-in cultivated land plus their own cultivated land). As off-farm employment continues to rise, these results give us hope that more cultivated land will be rented-out to those households who are interested in expanding their farm size (and focus on farming rather than off-farm employment).

Three separate results (from the part of the results that was not the direct focus of our study) also show that the renting-in and renting-out of cultivated land has facilitated better use of each household's available resources and resulted in more equitable distribution of land. First, the econometric analyses indicate that cultivated land has been shifting from households with less family labor to households with more family labor. Second, we find that cultivated land has been shifting from households with less agricultural equipment to households with more agricultural equipment. And, finally (third), the results demonstrate that cultivated land is shifting from households with more own cultivated land to those with less. In other words, China's cultivated land rental markets are moving land from those with less labor, less (productive) capital and more cultivated land to those with more labor, more capital and less cultivated land.

Because of these trends and relationships, it seems that the government should continue its policies to encourage cultivated land rental. The lesson from this paper is that while policies that directly encourage cultivated land rental may be important, it is equally important to promote off-farm employment. Off-farm employment is shown to be highly correlated with cultivated land rental. Therefore, as China's off-farm employment expands, we should expect to see cultivated land rental markets expand, too.

Notes

1. There could be a concern that if *ag_equipment* is included as a control variable it may be endogenous. However, our survey data show that purchases of most agricultural equipment were completed before the land transfer event. For example, in our sample, on average, the typical land rental event occurred 4.4 years after the year in which agricultural production equipment was purchased. In undertaking our regression analysis, we did the regression by both including and excluding the *ag_equipment* variable. The results are almost the same for the parameters of all other variables.

2. We were not able to run the Probit model with fixed effect estimation because the fixed effect estimation is not available for the Probit model in the STATA program that was used in this study.

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Appendix

Variable	Description and unit	Mean	SD
R_out	Rented-out: 0 – no, 1 – yes	0.13	0.33
R_in	Rented-in: 0 – no, 1 – yes	0.16	0.37
Head_OF$_{t-7}$	Household head had off-farm job seven years ago, 0 – no, 1 – yes	0.31	0.46
Other_OF$_{t-7}$	Number of other family members (excluding household head) that had off-farm job seven years ago	0.29	0.58
Ag_Equipment[a]	Value of equipment used for agricultural production normalized by the household's own cultivated land (yuan/ha)	8,937	25,845
Family labor	Number of family members in the labor force	2.80	1.07
Own cultivated land	Own cultivated land (not rented-in land) (ha)	0.42	0.51
Wealth[a]	*Per capita* durable consumption assets (yuan)	16,909	49,462

Notes: The size of the sample is 1,672; [a]note that all variables that are in value terms were put into real 2000 yuan terms using the Rural Consumer Price Index from the *China Statistical Yearbook* (China National Statistical Bureau, 2009)

Table AI.
Descriptive statistics of
the dependent and
independent variables
used in the regression
analyses

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