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Land Reallocations, Passive Land Rental, and the Development of Rental Markets in Rural China

James Kai-sing Kung^a and Satoru Shimokawa^{a*}

^aHong Kong University of Science and Technology

*E-mail: sosatoru@ust.hk

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Abstract

Based on a unique farm survey, this article intends to shed new light on the intriguing relationship between administrative land reallocations and the development of land rental markets in China. We find that the two alternative mechanisms of allocating arable land tend to be substitutes where land is reallocated “partially” only among households affected by demographic change (PLR). Where village-wide or “full-scale” reallocations (FSLR) are conducted among all households, however, land rental market transactions have increased in response to the enlarging mismatch in labor-land ratios across households; transactions that would not have occurred otherwise. While inefficient in the short-run, FSLR potentially facilitates the development of land rental markets as it unwittingly brings together parties with a mere arms-length relationship (e.g., non-relatives) to contract with each other, in light of the finding that households affected by PLR tend to lease land primarily to/from their own relatives or through the village authorities.

JEL Codes: O12, Q12, Q15

Keywords: Land reallocations; Passive Land rental; Rural; China

1. Introduction

Property rights, or institutions more generally, tend to play a crucial role in economic reforms, primarily because of the powerful incentive effects that the reassignment of residual claiming rights may confer on the affected parties. China's economic reforms, which began with the agricultural sector, demonstrate this reasoning most persuasively. Although a number of changes were implemented simultaneously to boost agricultural productivity and output, nearly half of the increase (48.7%) came from the change in property rights, specifically from the individualization of farmers' use and income rights (Lin, 1992: 46). From a theoretical standpoint, the breaking up and redistribution to farm households of the previously collectivized landholdings for individualized production and management has effectively ended the free-riding problem inherent in "team production" (Alchian and Demsetz, 1972; Johnson, McMillan and Woodruff, 2002).

China's agricultural reforms, radical as they were at the outset, have remained incomplete in an important respect—landownership has yet to be privatized. Communal ownership, which continues to underpin land property rights in China, implies that land use rights are guaranteed by "membership" in a well-demarcated community, which is typically acquired by birth or marriage; this arrangement implies that land will be reallocated periodically among farm households in response to demographic changes (Kung, 1995; Liu, Carter and Yao, 1998). Although this institutional arrangement helps to safeguard equity (and subsistence), it is achieved at the expense of economic efficiency. Allegedly, land reallocations create the kind of uncertainty analogous to the premature confiscation of land-specific investments—in particular, the application of organic

fertilizers, which benefits soil fertility in the long term. Tenure insecurity and subsequent under-investment are the alleged outcomes (Prosterman, Hanstad and Li, 1996; Wen, 1995). There is some empirical support for this claim (e.g., Deininger and Jin 2003; Jacoby, Rozelle, and Li, 2000; Li, Rozelle, and Brandt, 1998).

Owing to ideological and possibly distributive concerns, however, the Chinese government has been unwilling to privatize land rights. It has sought to alleviate tenure insecurity among farmers by encouraging a number of local institutional innovations that seek to improve tenure security (Kung, 2002a)¹ in the hope that one or more of these local experiments will eventually lead to the development of an active land rental market over the longer term (Kung, 2002b). To achieve these goals, in 2003, the Chinese government legislated the Rural Land Contracting Law, which calls for a strict prohibition of what is commonly known as full-scale land reallocation (FSLR), on the grounds that it affects not only households that have experienced demographic change but also those that have not, thereby heightening tenure insecurity. The new law does, however, allow villagers to reallocate land on a partial (PLR) basis, as these readjustments are confined to those households affected by demographic change and involve only a small portion of their holdings. In other words, the Chinese government

¹ In a certain county in Guizhou, a backward province in southwest China, the experiment involved the halting of land reallocations for an initial period of 15 years so that households confronted with population pressure had to resort to the rental market to obtain additional arable land (Kung, 2002a).

considers the effect of PLR on tenure insecurity to be significantly smaller than that of FSLR. There is indeed some empirical support for this claim (Kung and Bai, 2011).

In addition to its effect on tenure security, it is believed that the suppression of full-scale land reallocations would likely lead to the development of land rental markets, as long as the two are truly “substitutes” (e.g., Brandt, Rozelle, and Turner, 2004). This intuitive reasoning, however, is sometimes not supported empirically; a number of studies have found that villages in which land reallocations are frequent also tend to have active land rental markets (Lin, 1988; Yao 2000; Kung 2002b; Deininger and Jin 2005). On the other hand, with the exception of some ad hoc reasoning, none of these studies have fully explored the rationale behind this counter-intuitive finding. We thus seek to examine the respective effects of the two types of land reallocation on land rental market outcomes using a unique Chinese farm survey that distinguishes FSLR from PLR.

By employing both a fixed effects model and an instrumental variable approach to resolve the key endogenous independent variables of interest, viz. land reallocation and off-farm labor market activities,² we find that FSLR is positively and significantly correlated with land rental market transactions; conversely, PLR is significantly and negatively correlated with the land rental markets. We attribute this counter-intuitive finding to the fact that FSLR disrupts the equilibrium relationship between farm size and agricultural ability at the household level, thereby forcing some households to restore this

² These variables are likely simultaneously determined with land rental activity or correlated with land rental activity through other unobserved channels such as village topography and farmers’ managerial ability.

mismatch between land and labor through the land rental markets. We regard this kind of adjustment as “passive” land rental in the sense that it would not have been necessary had there been no FSLR in the first place.

Our analysis yields another interesting, counter-intuitive finding: FSLR has the unwitting effect of bringing together parties that do not inherently trust, or trade with, each other (i.e., neither relatives nor village leaders) to eventually engage in land rental transactions. Because PLR has a genuine “substitution” relationship with the land rental markets, unlike FSLR, the transacting parties brought together in villages predominated by PLR inherently trust and already trade with each other (either relatives or leaders in their own villages). Thus, although PLR is Pareto-preferred to FSLR in the short run, FSLR is more conducive to the development of land rental markets based on arms-length transactions in the longer run. Ironically, the latter pattern is precisely what the Chinese government hopes to promote by suppressing FSLR.

Although there is empirical evidence to support the Chinese government’s claim that suppressing FSLR helps to improve tenure security, unexpectedly, by disrupting the factor proportions of household (land and labor) endowments and forcing them to contract with each other on an arms-length basis, FSLR has inadvertently created conditions that are more conducive to the development of land rental markets over the longer term, notwithstanding the unnecessary costs of passive land rental that it has created in the short run.

Insofar as the Chinese government continues to uphold communal landownership in a context in which an increasing number of people are leaving agriculture, the extent to

which the land rental market is able to develop is of pivotal importance for the reallocation of both land and labor in China's rapidly changing economic landscape. While, with its benign impact on tenure security, one can readily understand why the Chinese government adopts a relatively lenient attitude towards PLR, our analysis reveals that the implications of FSLR for the development of factor markets—in particular the land rental market—have yet to be fully appreciated.

2. Data

The survey was organized by the Development Research Center (DRC)—a high-powered research and policy arm under China's State Council—in 2003 in six Chinese provinces selected on the basis of their geographical location. For instance, Zhejiang and Fujian provinces were selected to represent provinces along the rapidly developing southeastern coastal seaboard, whereas Hunan and Anhui provinces in central China were selected to represent the country's "grain basket" and locations characterized by active out-migration activities. To cover the southwest and the remote northeast, Sichuan and Heilongjiang provinces were chosen.

Two counties were selected from each of the six selected provinces. To ensure that the selected counties were broadly representative of their respective provinces, counties were ranked in terms of their per capita GDP, and those clustered around the mean were randomly selected; then, four townships were chosen from each county. Instead of selecting only the average performers, one township each from the higher- and lower-income categories was selected alongside the two middle-ranked townships.

Altogether, 48 townships were selected, after which two villages were selected for inclusion in the survey based on the same consideration as the choice of the counties. The sample comprised 95 villages in 48 townships in 12 counties in a total of 6 provinces. Finally, 22 farm households were selected randomly from each village's roster for the household survey, resulting in 2,055 household observations available for analysis.

Given that the primary goal of this survey is to document the *history* of land reallocation in villages characterized by diverse resource endowments, a more specific goal is to collect information on the type of reallocation—full-scale versus partial—that a village adopted *each* time since de-collectivization (circa 1978-2003). Specifically, the survey collected information on both the number of times and the specific years in which a village reallocated land between decollectivization. The data collected also include the time of the survey, the timing of and reasons for the most recent reallocation, the procedure followed in the most recent allocation and prior notifications, among other variables. Similar questions were asked about partial reallocations, in particular about the methods of readjustment.

To gauge the complex relationship between land reallocations and land rental market activities, the survey enumerated a number of variables pertaining to rental market behavior of the surveyed households, including whether they have participated in this market, the extent to which they have done so, and whether they participated on the demand or supply side. Moreover, given that rental market transactions are intimately linked to the development of the off-farm labor market, households were also asked to provide detailed information on their involvement in the labor market. Finally, the survey

enumerated many variables at both the household and village levels, ranging from socioeconomic to production characteristics.

Table 1 presents the means of all key variables for our sample of households and villages. To examine whether household socioeconomic characteristics in general and rental market behavior in particular are patterned upon the history of land reallocations, we divide our sample into four subsamples based on the experiences of land reallocations since decollectivization, which consist of four main types: No land reallocation, only FSLR, only PLR, and both FSLR and PLR. As shown in columns 2-5 of Table 1, we find that there are no clearly discernible patterns among these four subgroups in terms of means in both the key socioeconomic characteristics and rental market behavior.

3. FSLR, PLR, and Land Rental Markets in China

The effects of land reallocations on tenure security in China have been well rehearsed. Briefly, given that only households affected by demographic change (due to births, deaths, and marriages) are involved in PLR and that it is common knowledge that a negatively affected household is obligated to transfer only one of its several plots to another household, tenure is allegedly more secure than it is among those affected by FSLR, who not only fail to be exempted from the reallocation even though they are not affected by demographic change, but also are unable to retain any of the plots they currently cultivate (Kung and Bai, 2011). How do the two different modes of land reallocation affect land rental markets? We conjecture that much depends on the extent to which the land-to-labor ratio across farm households in a community is affected by these alternative

mechanisms of land adjustments, which in turn depends on the extent to which the adjustments are made in response to demographic change.

As Kung and Bai (2011) have shown, PLR takes place in response to demographic change. This implies that PLR is intended to maintain a constant land-to-population ratio despite demographic change, which further implies that the scope for land rental market transactions would likely be limited. Of course, if FSLR, like PLR, is undertaken in response to demographic change but on a larger scale, we may expect the scope of land exchange via the market to be even smaller. Empirical evidence, however, suggests that more than half of the surveyed villages (57.4% or 31/54) were instructed by government authorities above the village level to conduct FSLR under a policy implemented in 1998 urging village authorities to consolidate household farming by extending the contractual agreement with farmers for another 30 years after the original 15-year agreement was due to expire in 1999. Indeed, the fact that FSLR was implemented in only 22% (or 12) of our sample villages indicates that demographic change was their primary reason to reallocate land thoroughly. This finding implies that FSLR is likely to create a substantially greater mismatch between land and labor endowments across farm households, which in turn creates a much larger scope for readjusting these disruptions through the land rental market.

Descriptive evidence based on analyzing our survey data lends support to this conjecture. First, whereas only 7.6% of those who had readjusted their holdings on a partial basis (PLR) four times or more had rented land, the magnitude was 25.4% among those who had experienced FSLR with comparable frequency (Table 2). Our conjecture is

further strengthened by the finding that households that have never reallocated land do not differ significantly in land rental activity (12.2% in panel 1 versus 16.6% in panel 2, Table 2). Note, however, that this striking difference does not apply to the supply side of the land rental market. There is virtually no difference between those who have engaged frequently in FSLR (12%) versus PLR (9.1%) insofar as rent-out decisions are concerned.

Second, our thesis that FSLR creates a much larger scope for farmers to adjust their land-labor ratios via the land rental market is additionally borne out by comparing the change in land inequality after the two modes of land reallocation. Whereas the correlation coefficient within the FSLR villages is -0.50, the comparable correlation coefficient for the PLR villages is much smaller—only -0.19. Likewise, the Gini coefficient as measured by the same criterion (of per capita farm land) at the village level has decreased by 25.8% after each FSLR but only by 20.0% after each PLR, against an almost identical pre-reallocation mean of 0.21 for the FSLR villages and 0.22 for the PLR villages, respectively.³ Considering significant heterogeneity in household farm ability, the greater equal distribution of farm land that occurs after each FSLR is more likely to give rise to a much larger land-labor mismatch (Berck and Levy, 1986), which can cause a loss of agricultural productivity, and thus a much greater scope for land rental activity.

On the basis of this descriptive evidence, we predict that passive land rental is more likely to be observed among the farm households affected by FSLR than among those affected by PLR. This prediction is also analogous to saying that the scope of the

³ The lack of statistical significance between the two modes of land reallocation could be due simply to small sample size.

substitution effect is likely smaller in villages predominated by FSLR than in villages predominated by PLR. However, this descriptive analysis is unable to clarify whether the two alternative modes of land reallocation have distinctive effects on contractual insecurity. Based on these observations, the following section provides a more formal analysis for guiding the empirical work.

4. Conceptual Framework

Below, we propose a simple agricultural production model similar to those employed to explain how administrative land reallocations increase tenure insecurity or substitute for land rental markets. However, our model departs from these existing models, which treat land reallocations as strictly homogeneous, by incorporating the heterogeneity in terms of the frequency and magnitude of land reallocation. Specifically, we assume that there exists a unique reallocation policy $\mu_v = (\mu_{1v}, \dots, \mu_{nv})$ for village v with n households where $\mu_{iv} \geq 0$ and $\sum_{i=1}^n \mu_{iv} = n$, and that its frequency $f_v > 0$ in village v since decollectivization, so land reallocation is defined as $R_v = R(\mu_v, f_v)$. For villages that have never reallocated land, $\mu_{iv} = 1$ for all $i=1, \dots, n$, and $f_v = 0$. For the sake of simplicity, our model assumes that decisions pertaining to land reallocations are made by the village leaders (who may have taken into account individual household preferences) and are thus predetermined for all households. (We will deal with the issue of the endogeneity of land reallocations later in the section on estimation strategy.)

We incorporate the effect of land reallocation $R_v = R(\mu_v, f_v)$ into the analytical framework proposed in Jin and Deininger (2009), in which household i in village v

maximizes its profit (Π_{iv}) with respect to the amount of labor allocated to farming ($l_{iv,a}$) and wage employment ($l_{iv,o}$) and the amount of land to be farmed (A_{iv}), respectively, as follows:

$$\begin{aligned} \Pi_{iv} = & pg(\alpha_{iv}, l_{iv,a}, A_{iv}) + wl_{iv,o} - I^{in}[(A_{iv} - \mu_{iv}\bar{A}_{iv})(r + TCN(f_v))] \\ & + I^{out}[(\mu_{iv}\bar{A}_{iv} - A_{iv})(r - TCO(f_v))], \end{aligned} \quad (1)$$

subject to $l_a + l_o = \bar{L}$, where \bar{L} is a fixed amount of labor. p is the price of agricultural goods, and $g(\cdot)$ is a production function. α represents a given level of agricultural ability. I^{in} and I^{out} are indicators of renting in land and renting out land, respectively. \bar{A} is the amount of landholding, and w and r are wages and rents, respectively. TCN and TCO are the transaction costs associated with participation in the land rental markets (TCN denotes the costs of renting in land, and TCO denotes the costs of renting out land). We may think of TCN and TCO as functions of f , where $TCN(0) > 0$, $TCO(0) > 0$, $TCN(f+1) > TCN(f)$ and $TCO(f+1) > TCO(f)$.

Without loss of generality, we now assume $g(\alpha, l_a, A) = \alpha^{1-\beta_1-\beta_2} l_a^{\beta_1} A^{\beta_2}$.

Solving for the first-order conditions (FOCs) in terms of A (i.e., the optimal level of A , A^*) by taking a partial derivative of A^* in terms of α , we can show that the amount of rented-in land increases as agricultural ability (α) increases, holding other factors unchanged; conversely, the amount of land rented out will decrease as agricultural ability increases.

Premised on the conditions that $TCN(f+1) > TCN(f)$ and $TCO(f+1) > TCO(f)$, we can also show that the difference between $A^*(f+1)$ and $A^*(f)$ is negative for both rent-in and rent-out cases. Intuitively, this is the same as saying that a smaller amount of land

will be rented (in or out) when land is reallocated more frequently, holding other factors constant. The decrease in land rental is interpreted in this context as the result of contractual insecurity (see, for example, Kimura et al., 2011). Moreover, we may expect that increasing the frequency of land reallocation raises the transaction costs (in terms of contractual insecurity), which are likely to be larger for the rent-out households than for the rent-in households, primarily because once households rent out their land, they are at the mercy of their contractual parties in treating their land. Furthermore, there is also the possibility that the rent-in parties may delay returning the land upon contract expiry. For these reasons, we may thus expect $[TCN(f+1)-TCN(f)] < [TCO(f+1)-TCO(f)]$, implying that the negative effect of renting on contractual insecurity is larger for the households on the supplying end.

The last assumption of our model is that the amounts of land rented in (a^{in}) and out (a^{out}) will be $a^{in} = A^* - \bar{A}$ and $a^{out} = \bar{A} - A^*$, respectively, for those villages that have never reallocated land; and $a^{in} = A^* - \mu\bar{A}$ and $a^{out} = \bar{A} - \mu A^*$, respectively, for those that have reallocated land. With these notations specified, changes in the amounts of land rented in and out due to land reallocations can now be expressed as $\Delta a_R^{in} = (1 - \mu)\bar{A}$ and $\Delta a_R^{out} = (\mu - 1)\bar{A}$, respectively. The corollary is that, for the rent-in households ($\bar{A} < A^*$), land reallocation increases the amount of land that is rented in if $\mu < 1$, but decreases the amount of land that is rented in if $\mu > 1$. We can expect the opposite effects to hold for the rent-out households ($\bar{A} > A^*$).

Thus, compared to the case of no land reallocations, our model predicts that households will rent in (or out) a smaller amount of land when land reallocation

decreases the mismatch between their land endowment (\bar{A}) and optimal farm size (A^*). The decrease in land rental is referred to as the *substitution* effect. In contrast, households will rent more land when reallocation increases the mismatch between their land endowment and the optimal farm size. The increase in land rental caused by this mismatch is referred to as the *passive* land rental effect.

In summary, our model suggests that the total effect of land reallocation on the land rental activity of household i is the sum of the substitution, contractual insecurity, and passive land rental effects.⁴ What distinguishes our model from those in the existing literature, though, is that the total effect can be either positive or negative. In light of the descriptive analysis presented above, we expect FSLR to have a smaller substitution effect and a larger passive land rental effect relative to PLR, whereas the difference in the effect of contractual insecurity is ambiguous. In other words, our model not only allows the two different modes of land reallocation—namely FSLR and PLR—to have different effects on land rental market activity in the magnitude, but also allows the sign of their effects to be opposite.

5. Estimation Strategy

⁴ We can derive the same implication for the probability of renting land in (or out) by introducing the lower and upper critical levels of agricultural ability. Given that the derivation is basically similar to that presented in Jin and Deininger (2009), we do not repeat it here.

We examine the effects of land reallocation on three different aspects of land rental market activity: the likelihood of participating in it and, conditional on participation, the area of land rented and the choice of contractual party in the rental transactions. In all of the models, land reallocation experience is measured at the household level based on the frequencies of FSLR and PLR ($nflr_h$ and $nplr_h$, respectively) that household h has experienced since decollectivization.

First, to estimate the effects of $nflr_h$ and $nplr_h$ on the likelihood of participating in land rental markets, we employ the following probit models:

$$P(ri_h = 1|\mathbf{C}) = G\left(\beta_0^{ri} + \beta_{nflr}^{ri} nflr_h + \beta_{nplr}^{ri} nplr_h + \boldsymbol{\beta}_X^{ri'} \mathbf{X} + \mu_h^{ri} + \mu_v^{ri} + \varepsilon^{ri}\right) \quad (2)$$

$$P(ro_h = 1|\mathbf{C}) = G\left(\beta_0^{ro} + \beta_{nflr}^{ro} nflr_h + \beta_{nplr}^{ro} nplr_h + \boldsymbol{\beta}_X^{ro'} \mathbf{X} + \mu_h^{ro} + \mu_v^{ro} + \varepsilon^{ro}\right) \quad (3)$$

where ri_h and ro_h indicate land rental activities (where subscript i indicates rent in and subscript o indicates rent out). \mathbf{C} is the vector of all of the independent variables, and \mathbf{X} is a vector of other household and village characteristics. μ_h and μ_v represent unobserved factors that may influence land rental market activity at both the household and village levels, and ε is the error term.

Second, we estimate the effects of $nflr_h$ and $nplr_h$ on the land area rented in (ai_h) and rented out (ao_h) by employing the following Tobit models:

$$a_h^{in} = \alpha_0^{ai} + \alpha_{nflr}^{ai} nflr_h + \alpha_{nplr}^{ai} nplr_h + \boldsymbol{\alpha}_X^{ai'} \mathbf{X} + \mu_h^{ai} + \mu_v^{ai} + \varepsilon^{ai} \quad (4)$$

$$ai_h = \max(0, a_h^{in})$$

$$a_h^{out} = \alpha_0^{ao} + \alpha_{nflr}^{ao} nflr_h + \alpha_{nplr}^{ao} nplr_h + \boldsymbol{\alpha}_X^{ao'} \mathbf{X} + \mu_h^{ao} + \mu_v^{ao} + \varepsilon^{ao} \quad (5)$$

$$ao_h = \max(0, a_h^{out})$$

where a_h^{in} and a_h^{out} are the unobserved optimal amounts of land rented in and out, respectively. We employ the Tobit models because ai_h and ao_h are left-censored at zero. For example, 85% of the households in our sample have not participated in any land rental activity, and 90% have not rented out any land.

Third, we examine whether differences in land reallocation experiences have any effect on the choice of the contractual parties, conditional on participation in the land rental market. To examine this possibility, we divide the contractual parties into two groups: those with whom the participants have an inherent trust in transacting, namely relatives and village leaders (who presumably help to arrange for others to take up their slack in farming), and those with whom they basically have only an arms-length relationship, viz. the non-relatives (both within and outside the villages). We then employ a probit model to examine the effects of $nflr_h$ and $nplr_h$ on the choice of contractual parties: $rilt_h$ and $rotr_h$ (which stand for renting land from and to the inherently trusted parties, respectively) and $rotl_h$ and $rolt_h$ (which, respectively, stand for renting land from and to parties with only an arms-length relationship), according to the specification in equation (6).

$$P(r_h = 1|\mathbf{C}) = G(\pi_0^r + \pi_{nflr}^r nflr_h + \pi_{nplr}^r nplr_h + \pi_X^r \mathbf{X} + \mu_h^r + \mu_v^r + \varepsilon^r) \quad (6)$$

where r_h represents one of $ritr_h$, $rilt_h$, $rotr_h$, and $rolt_h$. The vectors \mathbf{X} and \mathbf{C} are the same vectors defined in equations (2) and (3). By the same token, we also examine the effects of $nflr_h$ and $nplr_h$ on the areas of land rented from $aitr_h$ and $ailt_h$ and rented to $aotr_h$ and $aolt_h$, respectively, by employing the following Tobit model:

$$s_h = \alpha_0^s + \alpha_{nflr}^s nflr_h + \alpha_{nplr}^s nplr_h + \alpha_X^s \mathbf{X} + \mu_h^s + \mu_v^s + \varepsilon^s \quad (7)$$

$$as_h = \max(0, s_h)$$

where as_h represents one of $aitr_h$, $ailt_h$, $aotr_h$, and $aolt_h$. The vector X is the same as defined in equations (4) and (5).

Moreover, it is reasonable to expect that land rental activity that took place in 2002 may be influenced more strongly by the most recent land reallocation (MRLR) than by the cumulative experiences of FSLR and PLR. To examine this possibility, we add two new dummy variables, $lflr_h$ and $lplr_h$, to equations (2) – (7), where $lflr_h$ and $lplr_h$ indicate whether the most recent reallocation experienced by household h is FSLR or PLR (we abbreviate these models as MRLR). Also, to ascertain whether the estimation results differ if we do not control for the difference between FSLR and PLR, we replace $nflr$ and $nplr$ in equations (2) – (6) with a single variable tlr_h , where tlr_h represents the overall frequency of land reallocations (i.e., $tlr_h = nflr_h + nplr_h$) (hereafter abbreviated as the TLR models).

In addition to the history of land reallocations, land rental market activity is likely to be affected by a household's agricultural ability, off-farm employment and income opportunities, and the contractual (transaction) costs arising from undertaking land rental activities. To take into account a household's agricultural ability, X includes the log of per capita household income, the share of agricultural income in overall income, household size, the proportion of household members in the workforce (among those aged between 16 and 60 years), the share of female household members, the share of household members who have received agricultural training, the characteristics of the household head (education level, age, whether he is an official), per capita arable farm

size, and the log of the value of agricultural assets. To capture the effects of the off-farm labor market, X also includes the share of off-farm workers in a household, the share of household members who have received non-agricultural training, the log of non-agricultural assets, and distance to the nearest prefecture (where marketing activities tend to be more concentrated). To capture the effect of transaction costs associated with land rental activities, X also includes the log of the land area rented, the log of agricultural tax, and village size, using the total number of households within the village as a proxy. Finally, we also include province dummies.

Fixed Effects and Instrumental Variable Models

Our key analytical interests are the partial effects of $nflr_h$ and $nplr_h$, which represent the total effects of FSLR and PLR, respectively, on land rental market activities. If the partial effects are significant and positive, the observed increase in land rental market activities due to passive land rental is larger than the decline in land rental market activities due to the substitution and contractual insecurity effects, and vice versa. The probit and Tobit models will provide consistent estimators of the partial effects only if μ_h , μ_v and ε are uncorrelated with all of the explanatory variables. However, there are good reasons to suspect that the unobserved factors may be correlated with the explanatory variables, biasing the estimates. First, the choice of both the intensity and frequency of land reallocations may be affected by unobserved village characteristics such as topography. Similarly, off-farm labor participation may be connected to land rental activity through

the unobserved transaction costs related to renting out land, such as connections to the village leaders and/or potential contractual parties.

To control for village-level unobserved factors (μ_v) that are common among all villagers, we employ the village-level fixed effects (FE) model by using cross-sectionally de-meaned variables. To distinguish the effect after controlling for μ_v from estimations using the linear models instead of the probit or Tobit models, we also present the results of the OLS regressions.

Because the FE models do not control for household-level unobserved factors (μ_h), we employ the IV estimations to instrument the potential endogeneity of *nflr*, *nplr* and the share of off-farm workers within a household. However, even though we attempted to specify the IV probit and IV Tobit models by using the maximum likelihood (ML) approach, they failed to converge. This causes concern for estimates derived from the two-step approach. Owing to the high correlations between province dummies and other explanatory variables (particularly the instrumented endogenous variables), we think multicollinearity might be a problem. For example, the Variance Inflation Factors (VIF) of the six province dummies, which range from 2.21 to 11.66, against the overall average VIF of 2.03 proves the point. However, it is critical to control for the province dummies. As an alternative, we employ the province-level fixed effects approach (the VIFs of the de-meaned variables now range from 1.05 to 2.31, compared to the average VIF of 1.32) and incorporate the IV estimations into the province-level FE model (hereafter referred to as the IVFD model). Note that because all of the excluded instruments in our IV estimations are village-level variables, we are unable to incorporate

the IV approach into the village-level FE model. Also, we are unable to apply the IV approach to the MRLR models because we have only four excluded instruments.⁵

We now turn to describing our excluded instruments. Suppose there are n villages within a county. We construct an instrument for village v by taking the average of a village characteristic over all of the surveyed villages within the same county except for the village v itself (i.e., an average over $n-1$ villages). We obtain four excluded instruments by applying this $n-1$ strategy to four village characteristics: the average number of plots farmed per household, the average number of crops cultivated, the share of off-farm workers, and the average income level of off-farm workers. The average number of plots farmed per household is a proxy for village topography; the average number of crops cultivated is a proxy for cropping patterns; and the share of off-farm workers and average income level of off-farm workers together represent the conditions of off-farm labor markets. We expect that village topographies, cropping patterns, and off-farm labor markets will be closely related beyond the village boundaries, and thus these $(n-1)$ averages are correlated with the corresponding characteristics in village v that directly influence village v 's land reallocation and off-farm labor activity. In contrast, we expect these $(n-1)$ averages to be indirectly correlated with land rental activities within village v because rentals of arable land seldom go beyond a village's boundaries. The

⁵ We attempted to generate another excluded instrument. However, the $(n-1)$ average of per capita arable land is insignificant in all of the first-stage regressions, and inclusion of the $(n-1)$ average of mean crop prices violates the overidentification tests in all of the IV models.

validity of the instruments will be further examined in the section describing the empirical results.

Finally, we also examine models that take into account the potential endogeneity of only the share of off-farm workers (i.e., *nflr* and *nplr* are assumed to be predetermined)—models that are most useful for clarifying how FSLR and PLR may influence the IV estimates separately. However, even when we include only one endogenous variable, the IV Tobit models still fail to reach convergence by using the ML approach. Thus, we will focus on the results based on the IV probit models using the ML approach (hereafter referred to as the IVP-OFW models).

6. Estimation Results

Overall, we find that land reallocations have systematically different effects on land rental activities between the demand and supply sides; we will therefore analyze them separately.

Tables 3 and 4 summarize the results of the effects of FSLR and PLR on rent-in activity, and Tables 5 and 6 summarize the results pertaining to the effects on rent-out activity, respectively. The upper panels of Tables 3 and 5 present the effects of land reallocations on the probability of participating in the land rental market, and the lower panels present the effects on the area of land rented conditional upon participation. Tables 4 and 6 present the effects of land reallocations on the choice of contractual partner (i.e., of being more or less trusting). Standard errors in all models (if applicable) are clustered by province and thus allow for intra-province correlations.

It is worth noting that our excluded instruments are jointly significant at the 5% level in all of the first-stage regressions in the IV models. The hypotheses that the first-stage coefficients of all of the variables are jointly equal to zero are similarly rejected at the 1% level in all models. The over-identification tests fail to reject the null hypothesis in all of the IV models (with p-values ranging from 0.27 to 0.75). An exception is the IVFE model, which estimates the area of the land rented out (the p-value is 0.02), where the two-step approach is used for the IVP-OFW for conducting the test. In addition, a Hausman test rejects the null hypothesis that the FE and IVFE coefficient estimates are identical for both the rent-in and rent-out models. Although these results do not guarantee the validity of our instruments, they do not rule out the possibility that the IV models may help to reduce the potential endogeneity bias.

Effects of FSLR and PLR on Land Rent-in Activity

In the basic probit and OLS models (columns 1 and 2 in Table 3), the probability of renting in land is positively associated with the frequency of FSLR and negatively associated with the frequency of PLR. These associations remain unchanged even after we control for village-level unobserved factors in the FE models (column 3) and the endogenous share of off-farm workers in the IVP-OFW models (column 5). Given that the estimates of partial effects are similar between the probit and OLS models, the FE models (i.e., linear models) arguably provide reasonable approximations of the partial effects on at least the probabilities around the mean. According to the FE estimates, with each additional FSLR, the probability of renting in land increases by 1.9%, whereas with

each additional PLR it decreases by 0.9%. The negative effect of PLR similarly holds in the IVFE models that control for the endogenous frequencies of FSLR and PLR and the share of off-farm workers (column 4), with significantly larger coefficients than in the other four baseline models. In contrast, the positive effect of FSLR becomes smaller and insignificant in the IVFE estimate. The IVFE estimate indicates that the probability of renting in land decreases by 27.8% with each additional PLR.

In the Tobit models, we find that the area of rented-in land is positively associated with the frequency of FSLR and negatively associated with the frequency of PLR. Contrary to the effect on the probability of renting in land, in the corresponding IVFE models, only the positive effect of FSLR remains statistically significant. The IVFE estimate indicates that the area of rented-in land increases by 2.0 *mu* (1 *mu* = 0.0667 hectare) with each additional FSLR.

The MRLR models further substantiate the premise that decisions to rent in land are primarily influenced by *cumulative* land reallocations rather than the most recent land reallocation (MRLR). According to the FE estimates, the probability of renting in land increases by 2.8% with each additional FSLR and decreases by 1.1% with each additional PLR. However, the results of the MRLR Tobit models suggest that the area of the land rented in is negatively and significantly correlated with the cumulative result of PLR. The estimate indicates that the area of land rented in decreases by 0.48 *mu* with each additional PLR. On the other hand, the TLR models show that the frequency of land reallocations is not significantly associated with the decision to rent in land.

We now attempt to interpret these results within the context of our conceptual framework. First, the positive correlation between FSLR and rent-in activity suggests that the effect of passive land rental dominates both the substitution effect and the contractual insecurity effect—at least for the area of land rented in. In contrast, the negative effect of PLR on rent-in activity suggests that the sum of the substitution and contractual insecurity effects dominates the passive land rental effect, although we are unable to distinguish the two from each other. The results from the TLR models also suggest that failure to distinguish between FSLR and PLR is likely to understate the impact of land reallocations on rent-in activity.

Finally, Table 4 shows that FSLR has a significant and positive effect on renting in land from those with whom the renter has only an arms-length relationship, whereas PLR has a significant and negative effect on renting in land from those whom the renter inherently trusts. For example, an additional FSLR increases the likelihood of renting in land from a less trusted party by 10.8% (IVFE model) and increases the land area rented in by 0.41 *mu* (the Tobit model). By contrast, an additional PLR decreases the likelihood of renting in land from a trusted party by 18.5% (the IVFE model) and decreases the land area rented in by 0.26 *mu* (the Tobit model). Although passive land rental is inefficient in the short run, it may confer longer-term benefits in terms of the development of the land rental markets, assuming that farmers who are forced to engage in rental activities become increasingly accustomed to land market transactions over time. The possible beneficial long-term effect of passive land rental on the development of genuine land rental markets becomes all the more convincing in light of the finding that PLR has only

limited substitution effects; i.e., the majority of rental market transactions resulting from PLR are conducted between parties who have an inherent trust in each other.

Effects of FSLR and PLR on Rent-out Activity

Although the baseline and TLR models (in Table 5) provide no strong evidence that land reallocations have a significant effect on rent-out activity specifically, the MRLR models show that the latter is largely influenced by the most recent land reallocation. For example, the FE estimates indicate that the most recent FSLR or PLR increases the probability of renting out land by 5.0 % and 2.5 %, respectively. Similarly, the Tobit estimates show that the most recent FSLR or PLR increases the area of land rented out by 0.27 *mu* and 0.12 *mu*, respectively.

In Table 6, only in the MRLR models, we identify significant effects of FSLR and PLR on rent-out activity. For example, the FE estimates indicate that the most recent FSLR or PLR increases the probability of renting out land to parties with an arms-length relationship by 4.3 % and 3.5 %, respectively, and increases the amount of land rented out by 0.28 *mu* and 0.21 *mu*, respectively (the Tobit estimates).

Although it is counterintuitive to think that the most recent reallocation—regardless of its intensity (FSLR or PLR)—has the same positive effect on rent-out activity, it may be better accounted for by the channel pertaining to the development of the off-farm economy than by passive land rental. That is, the local off-farm economy may be developing so rapidly that village-level land reallocations are simply not enough to cope with the demand (or supply) of rented land. Although this conjecture could not be

directly tested with our data, the following observations provide some indirect support. In our sample, some households have rented out their land to non-relatives outside of their villages. This proportion is high in the provinces of Zhejiang (22.4%), Fujian (17.8%), and Sichuan (12.9%), but low (0.0% - 5.1%) in the other three provinces, where the off-farm economy is less developed. In contrast, the proportion of households who rented in land from non-relatives outside of their villages is very small for all six provinces (0.0% – 6.2%). In terms of contractual insecurity, non-relatives outside of renters' villages are perhaps the riskiest of all options compared to both unrelated households within their own villages and relatives outside of their villages. Thus, these observations suggest that the rapid development of the off-farm economy is likely to have resulted in an excess supply of land for reallocation—including reallocation through the rental markets.

Differences in the Effects of Land Reallocation on Rent-in and Rent-out Activities

First, we find that FSLR and PLR have opposite effects on rent-in activity, but both FSLR and PLR have the same effect on rent-out activity. Second, whereas rent-in activity is determined primarily by the cumulative frequency of land reallocations, rent-out activity is correlated positively with the most recent land reallocation. This subsection explores the potential explanations for these differences.

We attribute the first finding to the distinct difference between rent-in and rent-out activities. First, it is safe to assume that farming is an important income source for the rent-in households, but not for those that rent out. In our sample, the average share of agricultural income in total household income is 61.2% among those who have rented in

land, but only 10.2% for the households that have rented out. This difference suggests that rent-in activity is likely more sensitive to the differences between FSLR and PLR (refer to section 3 for more details) than rent-out activity. Second, rent-out activity may be driven mainly by conditions in the off-farm labor markets, for reasons already described. In our sample, 79% of the rent-out households reported that an overriding reason for renting out land was a reduction in their farm labor force, which in turn was caused by an increase in off-farm activities. Within the context of a village economy, the conditions of off-farm labor markets that households face must be broadly similar (even though different subgroups in a village have experienced land reallocations differently). This may explain why the decision to rent out is likely to be less sensitive to differences in the experience of land reallocations, which in turn explains why there is no difference between the effects of FSRL and PLR on rent-out activity.

The second finding may be accounted for by the “last-period” behavior of the rent-out households. In our sample, 72% of those households that rented land out had already discontinued farming. Additionally, 53.5% of these households reduced the size of their land holdings in the most recent reallocation (the same is not observed for those households that rented in more land).

Finally, it is important to note that these findings provide little evidence on the effect of contractual insecurity on rent-out activity. This effect may be similarly insignificant for decisions pertaining to rent-in activity, as our conceptual framework suggests that contractual insecurity is more of a concern for the rent-out households. In

this sense, the negative effect of PLR on rent-in activity can be accounted for mostly by the substitution effect.

7. Conclusions

By drawing on a farm survey that uniquely distinguishes FSLR from PLR, we tested their respective effects on the development of land rental markets. We found that the substitution effect that is presumed to exist between administrative land reallocations and land rental markets holds only in the case of PLR, primarily because under this regime land is reallocated in response to demographic changes. In contrast, because many farm households that have not experienced demographic adjustments are also affected by FSLR, it has given rise to proportionately more rental market transactions, leading to what may be regarded as passive land rental, or to transactions that would not have occurred in the absence of these administrative adjustments.

Although passive land rental is by no means efficient in the short run, there appears to be a subtle virtue associated with this particular outcome over the longer term; namely, it may be more likely than PLR to facilitate the development of a land rental market. By examining the identity of the contractual parties, we found that households under the FSLR regime were probably forced to contract with parties whom they do not know well (such as non-relatives from outside the village), whereas their counterparts under the PLR regime only have to contract with parties whom they inherently trust—specifically, relatives and leaders in their own villages. The difference in the scales of the

land rental markets between villages using the two modes of land reallocation is crucial in accounting for the observed difference.

What is worth emphasizing in this context is that there may be tradeoffs over time between the two land reallocation regimes insofar as their consequences for the development of land rental markets are concerned. That is, although, with its negative effect on tenure security and passive land rental, the policy of suppressing FSLR appears to be reasonable, its unexpected benign effect on the development of land rental markets in the longer run is a much neglected topic. This longer-run effect of FSLR should be paid greater policy attention by the Chinese leadership as long as it continues to uphold the principles of communal land rights. These findings provide useful insights not only for China but also for other developing countries where the level of development restricts land rental markets to a passive measure (e.g., Vietnam) regarding how to balance between administrative land reallocation and land rental markets following their economic development.

References

- Alchian, A., and H. Demsetz. 1972. "Production, Information Costs, and Economic Organization." *American Economic Review* 62 (5): 777-795.
- Brandt, L., S. Rozelle, and M. Turner. 2004. "Local Government Behavior and Property Right Formation in Rural China." *Journal of Institutional and Theoretical Economics* 160(4): 627-662.
- Berck, P., and A. Levy. 1986. "The Costs of Equal Land Distribution: The Case of the Israeli Moshavim." *American Journal of Agricultural Economics* 68(3): 605-614.
- Deininger, K., and S. Jin. 2003. "The Impact of Property Rights on Household's Investment, Risk Coping, and Policy Preferences: Evidence from China." *Economic Development and Cultural Change* 51(4): 851-82.
- Deininger, K., and S. Jin. 2005. "The potential of land rental markets in the process of economic development: Evidence from China." *Journal of Development Economics* 78(1): 241-270.
- Jacoby, Hanan G., G. Li, and S. Rozelle. 2002. "Hazards of Expropriation: Tenure Insecurity and Investment in Rural China." *American Economic Review* 92(5): 1420-1447.
- Jin, S., and K. Deininger. 2009. "Land rental markets in the process of rural structural transformation: Productivity and equity impacts from China." *Journal of Comparative Economics* 37(4): 629-646.
- Johnson, S. H., J. McMillan, and C. Woodruff. 2002. "Property Rights and Finance." *American Economic Review* 92 (5): 1335-1356.

- Kimura, S., K. Otsuka, T. Sonobe, and S. Rozelle. 2011. "Efficiency of Land Allocation through Tenancy Markets: Evidence from China." *Economic Development and Cultural Change* 59(3): 485-510.
- Kung, J. K. 1995. "Equal Entitlement versus Tenure Security under a Regime of Collective Property Rights: Peasants' Preference for Institutions in Post-Reform Chinese Agriculture." *Journal of Comparative Economics* 21 (2): 82-111.
- Kung, J. K. 2002a. "Choice of Land Tenure in China: The Case of a County with Quasi-Private Property Rights." *Economic Development of Cultural Change* 50 (4): 793-818.
- Kung, J. K. 2002b. "Off-Farm Labor Markets and the Emergence of Land Rental Markets in Rural China." *Journal of Comparative Economics* 30 (2): 395-414.
- Kung, J. K., and Y. Bai. 2011. "Induced Institutional Change or Transaction Costs? The Economic Logic of Land Reallocations in Chinese Agriculture." *Journal of Development Studies* First published on 28 March (iFirst), DOI: 10.1080/00220388.2010.506916.
- Li, G., S. Rozelle, and L. Brandt. 1998. "Tenure, Land rights, and Farmer Investment Incentives in China." *Agricultural Economics* 19(1-2): 63-71.
- Lin, Y.F. 1988. "Rural Factor Markets in China: After the Household Responsibility System Reform" in *Chinese Economic Policy*, ed. B. L. Reynolds. Professors World Peace Academy, New York. Chapter 6: p169-203.
- Lin, J. Y. 1992. "Rural Reforms and Agricultural Growth in China" *American Economic Review*. *American Economic Review* 82 (1): 34-51.

- Liu, S., M. Carter, and Y. Yao. 1998. "Dimensions and Diversity of Property Rights in Rural China: Dilemmas on the Road to Further Reform." *World Development* 26(10): 1789-1806.
- Prosterman, R., T. Hanstad, and P. Li. 1996. "Can China Feed Itself?" *Scientific American* 275 (5): 90-96.
- Rozelle, S., and G. Li. 1998. "Village Leaders and Land-Rights Formation in China." *American Economics Review* 88(2): 433-438.
- Wen, G. J. 1995. "The Land Tenure System and Its Saving and Investment Mechanism: the Case of Modern China." *Asian Economic Journal* 9 (3): 223-59.
- Yao, Y. 2000. "The Development of the Land Lease Market in Rural China." *Land Economics* 76(2): 252-266.

Table 1. Key Characteristics of Households in the Development Research Center Farm Survey in China in 2003

| | | All | Households that experienced | | | |
|--------------------------------|--|---------|-----------------------------|-----------|----------|-----------------|
| | | | No LR | Only FSLR | Only PLR | Both FSLR & PLR |
| | # of provinces | 6 | - | - | - | - |
| | # of villages | 95 | - | - | - | - |
| | # of households | 2,055 | 292 | 1,067 | 531 | 165 |
| Land rental market activity | Rent in land* | 0.15 | 0.14 | 0.17 | 0.11 | 0.13 |
| | Rent out land* | 0.10 | 0.07 | 0.11 | 0.10 | 0.10 |
| LR experiences | Total # of LR | 2.01 | 0.00 | 2.43 | 1.81 | 3.45 |
| | # of FSLR | 1.41 | 0.00 | 2.43 | 0.00 | 1.79 |
| | # of PLR | 0.68 | 0.00 | 0.00 | 1.82 | 2.61 |
| Household demographics | HH size (<i>person</i>) | 4.02 | 3.79 | 4.04 | 4.07 | 4.10 |
| | Share of ages 16-60 | 0.72 | 0.74 | 0.71 | 0.73 | 0.72 |
| | Share of females | 0.49 | 0.48 | 0.48 | 0.51 | 0.49 |
| | Share of off-farm workers | 0.25 | 0.26 | 0.24 | 0.27 | 0.30 |
| Household head Characteristics | HH head age (<i>year</i>) | 46.72 | 47.10 | 46.68 | 46.43 | 47.19 |
| | HH head attained high edu* | 0.04 | 0.05 | 0.03 | 0.04 | 0.05 |
| | HH head attained mid edu* | 0.50 | 0.53 | 0.46 | 0.56 | 0.58 |
| | HH head attained low edu* | 0.46 | 0.42 | 0.51 | 0.41 | 0.38 |
| | HH head is a cadre* | 0.23 | 0.29 | 0.19 | 0.24 | 0.33 |
| Income and Assets | per capita HH income (<i>yuan</i>) | 3239.75 | 3213.34 | 3398.05 | 2508.99 | 4614.55 |
| | Share of ag income | 0.46 | 0.55 | 0.44 | 0.49 | 0.33 |
| | Ag assets (<i>yuan</i>) | 18.36 | 11.47 | 23.57 | 12.30 | 30.57 |
| | Non-ag assets (<i>yuan</i>) | 2.34 | 1.80 | 2.12 | 2.75 | 4.53 |
| | Arable land per capita (<i>mu</i>) | 1.77 | 1.88 | 1.90 | 1.77 | 0.78 |
| | Average ag tax (<i>yuan</i>) | 176.68 | 190.14 | 170.06 | 191.28 | 148.74 |
| Village Characteristic | Village size (<i>total # of HH</i>) | 466.18 | 414.75 | 490.05 | 456.38 | 434.36 |
| | Dist to a prefectural city (<i>km</i>) | 22.71 | 26.08 | 22.25 | 20.17 | 27.85 |
| | Average land rent (<i>yuan</i>) | 74.75 | 110.75 | 45.96 | 124.87 | 35.99 |

Note:

- 1) LR = land reallocation, FSLR = full-scale land reallocation, PLR = partial land reallocation, # = number, HH = household, edu = education level, ag = agricultural, and dist = distance.
- 2) Variables with * are binary variables that represent the denoted event.

Table 2. Associations between Land Rental Market Activity and the Number of FSLR and PLR Experienced

| | | Observation number | Proportion of HH renting in land | Proportion of HH renting out land |
|--------------------------------------|-----------|--------------------|----------------------------------|-----------------------------------|
| Number of FSLR experienced by HH | 0 | 823 | 12.2% | 8.6% |
| | 1 | 545 | 13.8% | 9.5% |
| | 2 | 216 | 10.6% | 10.2% |
| | 3 | 187 | 19.3% | 13.9% |
| | 4 or more | 284 | 25.4% | 12.0% |
| Number of PLR experienced by HH | 0 | 1,359 | 16.6% | 10.0% |
| | 1 | 371 | 13.2% | 8.9% |
| | 2 | 152 | 11.8% | 10.5% |
| | 3 | 107 | 8.4% | 13.1% |
| | 4 or more | 66 | 7.6% | 9.1% |
| Total Number of LR experienced by HH | 0 | 294 | 13.9% | 6.8% |
| | 1 | 745 | 13.4% | 9.4% |
| | 2 | 345 | 12.2% | 8.1% |
| | 3 | 304 | 14.5% | 14.1% |
| | 4 or more | 367 | 21.5% | 12.0% |

Note: LR = land reallocation, FSLR = full-scale land reallocation, PLR = partial land reallocation, and HH = household.

Table 3. Partial Effects of Full-scale Land Reallocation (FSLR) and Partial Land Reallocation (PLR) on Land Rent-in Activity

| <i>Column Number</i> | OLS (1) | Probit (2) | FE (3) | IVFE (4) | IVP-OFW (5) |
|---|------------|---------------|-----------|-------------|----------------|
| Dependent Variable = Rent in land (1 = Yes, 0 = No) | | | | | |
| Basic Model | | | | | |
| # of FSLR experienced | 0.021** | 0.019*** | 0.019* | -0.004 | 0.015* |
| # of PLR experienced | -0.015*** | -0.018*** | -0.009*** | -0.278** | -0.019** |
| MRLR Models | | | | | |
| the Latest LR was FSLR | 0.013 | 0.028 | -0.078** | - | 0.016 |
| the Latest LR was PLR | 0.013 | 0.028 | -0.016 | - | 0.022 |
| # of FSLR experienced | 0.020** | 0.016** | 0.028** | - | 0.014 |
| # of PLR experienced | -0.016*** | -0.022*** | -0.011* | - | -0.022** |
| TLR Models | | | | | |
| total # of LR experienced | 0.002 | 0.003 | -0.002 | -0.006 | 0.002 |
| | OLS | Tobit | FE | IVFE | |
| Dependent Variable = Size of land rented in (<i>mu</i>) | | | | | |
| Basic Models | | | | | |
| # of FSLR experienced | 0.236 | 0.336* | 0.303 | 2.036* | |
| # of PLR experienced | -0.061 | -0.331* | 0.014 | -1.883 | |
| MRLR Models | | | | | |
| the Latest LR was FSLR | 1.286 | 1.034 | -0.835 | - | |
| the Latest LR was PLR | 1.450 | 1.138 | 1.286 | - | |
| # of FSLR experienced | 0.150 | 0.246 | 0.498 | - | |
| # of PLR experienced | -0.182 | -0.484* | -0.190 | - | |
| TLR Models | | | | | |
| total # of LR experienced | 0.072 | 0.062 | 0.097 | 2.050 | |
| Number of Observations | 2,055 | 2,055 | 2,055 | 2,055 | 2,055 |

Note:

- 1) *** = 0.01 level, ** = 0.05 level, * = 0.10 level significance.
- 2) FE = the village-level fixed effects model; IVFE = the province-level fixed effects model with instrumental variables; and IVP-OFW = the IV probit model that take into account the endogeneity of the share of off-farm workers.
- 3) Partial effects at means are reported for probit, Tobit, and IVP-OFW models.

Table 4. Partial Effects of Full-scale Land Reallocation (FSLR) and Partial Land Reallocation (PLR) on the Choice of People from Whom Farmers Rent in Land

| <i>Column Number</i> | OLS (1) | Probit (2) | FE (3) | IVFE (4) | Tobit (5) |
|--|------------|---------------|-----------|-------------|--------------|
| Dependent Variable = Rent in Land from Trustable People (1 = Yes, 0 = No) / Land Size for Tobit | | | | | |
| Basic Model | | | | | |
| # of FSLR experienced | 0.008 | 0.006 | 0.008 | 0.011 | 0.130 |
| # of PLR experienced | -0.010*** | -0.014*** | -0.010** | -0.185** | -0.258*** |
| MRLR Models | | | | | |
| the Latest LR was FSLR | 0.021 | 0.026 | 0.021 | - | 0.718** |
| the Latest LR was PLR | -0.005 | 0.007 | -0.005 | - | 0.181 |
| # of FSLR experienced | 0.003 | 0.002 | 0.003 | - | 0.009 |
| # of PLR experienced | -0.008*** | -0.013* | -0.008* | - | -0.223* |
| TLR Models | | | | | |
| total # of LR experienced | -0.002 | -0.002 | -0.002 | 0.010 | -0.018 |
| Dependent Variable = Rent in Land from Less Trustable People (1 = Yes, 0 = No) / Land Size for Tobit | | | | | |
| Basic Models | | | | | |
| # of FSLR experienced | 0.015*** | 0.011*** | 0.015*** | 0.108* | 0.405*** |
| # of PLR experienced | -0.003 | -0.003 | -0.003 | -0.017 | -0.111 |
| MRLR Models | | | | | |
| the Latest LR was FSLR | -0.002 | 0.014 | -0.002 | - | 0.862 |
| the Latest LR was PLR | 0.018 | 0.020 | 0.018 | - | 1.462 |
| # of FSLR experienced | 0.018** | 0.010** | 0.018*** | - | 0.392* |
| # of PLR experienced | -0.006 | -0.005 | -0.006 | - | -0.297 |
| TLR Models | | | | | |
| total # of LR experienced | 0.007 | 0.005 | 0.007* | 0.017 | 0.185 |
| Number of Observations | 2,055 | 2,055 | 2,055 | 2,055 | 2,055 |

Note:

- 1) *** = 0.01 level, ** = 0.05 level, * = 0.10 level significance.
- 2) FE = the village-level fixed effects model; and IVFE = the province-level fixed effects model with instrumental variables.
- 3) Partial effects at means are reported for probit and Tobit models.

Table 5. Partial Effects of Full-scale Land Reallocation (FSLR) and Partial Land Reallocation (PLR) on Land Rent-out Activity

| <i>Column Number</i> | OLS (1) | Probit (2) | FE (3) | IVFE (4) | IVP-OFW (5) |
|--|------------|---------------|-----------|-------------|----------------|
| Dependent Variable = Rent out land (1 = Yes, 0 = No) | | | | | |
| Basic Model | | | | | |
| # of FSLR experienced | -0.002 | -0.001 | -0.002 | 0.055 | 0.007 |
| # of PLR experienced | -0.006 | -0.004* | -0.005 | 0.083 | -0.006 |
| MRLR Models | | | | | |
| the Latest LR was FSLR | 0.060* | 0.037** | 0.050* | - | 0.093** |
| the Latest LR was PLR | 0.035*** | 0.020*** | 0.025*** | - | 0.048 |
| # of FSLR experienced | -0.010* | -0.007** | -0.007 | - | -0.007 |
| # of PLR experienced | -0.007 | -0.004 | -0.006 | - | -0.008 |
| TLR Models | | | | | |
| total # of LR experienced | -0.002 | -0.001 | -0.003 | 0.057 | -0.001 |
| | OLS | Tobit | FE | IVFE | |
| Dependent Variable = Size of land rented out (<i>mu</i>) | | | | | |
| Basic Models | | | | | |
| # of FSLR experienced | -0.017 | -0.009 | 0.024 | 0.044 | |
| # of PLR experienced | -0.015 | -0.026 | -0.013** | 0.367 | |
| MRLR Models | | | | | |
| the Latest LR was FSLR | 0.185** | 0.266** | 0.057 | - | |
| the Latest LR was PLR | 0.057** | 0.115*** | 0.051* | - | |
| # of FSLR experienced | -0.048** | -0.049* | 0.020 | - | |
| # of PLR experienced | -0.011 | -0.026 | -0.017 | - | |
| TLR Models | | | | | |
| total # of LR experienced | -0.015 | -0.012 | 0.004 | 0.048 | |
| Number of Observations | 2,055 | 2,055 | 2,055 | 2,055 | 2,055 |

Note:

- 1) *** = 0.01 level, ** = 0.05 level, * = 0.10 level significance.
- 2) FE = the village-level fixed effects model; IVFE = the province-level fixed effects model with instrumental variables; and IVP-OFW = the IV probit model that take into account the endogeneity of the share of off-farm workers.
- 3) Partial effects at means are reported for probit, Tobit, and IVP-OFW models.

Table 6. Partial Effects of Full-scale Land Reallocation (FSLR) and Partial Land Reallocation (PLR) on the Choice of People to Whom Farmers Rent out Land

| <i>Column Number</i> | OLS (1) | Probit (2) | FE (3) | IVFE (4) | Tobit (5) |
|--|------------|---------------|-----------|-------------|--------------|
| Dependent Variable = Rent out Land to Trustable People (1 = Yes, 0 = No) / Land Size for Tobit | | | | | |
| Basic Model | | | | | |
| # of FSLR experienced | 0.002 | 0.000 | 0.002 | 0.016 | 0.005 |
| # of PLR experienced | -0.003 | -0.001 | -0.003 | 0.008 | -0.019 |
| MRLR Models | | | | | |
| the Latest LR was FSLR | 0.019 | 0.007 | 0.019 | - | 0.131 |
| the Latest LR was PLR | -0.001 | -0.002 | -0.001 | - | -0.018 |
| # of FSLR experienced | -0.002 | -0.002 | -0.002 | - | -0.023 |
| # of PLR experienced | -0.001 | 0.000 | -0.001 | - | -0.007 |
| TLR Models | | | | | |
| total # of LR experienced | 0.001 | 0.000 | 0.001 | 0.017 | 0.002 |
| Dependent Variable = Rent out Land to Less Trustable People (1 = Yes, 0 = No)/ Land Size for Tobit | | | | | |
| Basic Models | | | | | |
| # of FSLR experienced | -0.004 | 0.000 | -0.004 | 0.042 | -0.012 |
| # of PLR experienced | -0.003 | -0.001 | -0.003 | 0.070 | -0.016 |
| MRLR Models | | | | | |
| the Latest LR was FSLR | 0.043** | 0.020** | 0.043** | - | 0.283*** |
| the Latest LR was PLR | 0.035** | 0.020* | 0.035** | - | 0.208** |
| # of FSLR experienced | -0.009* | -0.003 | -0.009* | - | -0.045* |
| # of PLR experienced | -0.005* | -0.002 | -0.005 | - | -0.030 |
| TLR Models | | | | | |
| total # of LR experienced | -0.003 | -0.001 | -0.003 | 0.043 | -0.011 |
| Number of Observations | 2,055 | 2,055 | 2,055 | 2,055 | 2,055 |

Note:

- 1) *** = 0.01 level, ** = 0.05 level, * = 0.10 level significance.
- 2) FE = the village-level fixed effects model; and IVFE = the province-level fixed effects model with instrumental variables.
- 3) Partial effects at means are reported for probit and Tobit models.