

Efficiency of Land Allocation through Tenancy Markets: Evidence from China

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I. Introduction

In rapidly growing developing countries, the transfer of land rights from those who move to nonfarm sectors, or migrating households, to those who continue farming, or remaining farm households, is critically important for successful industrialization and the structural transformation of the agriculture sector (Otsuka, Estudillo, and Sawada 2009). If land markets are inefficient, migrating households cannot liquidate their land assets and the remaining farm households cannot expand their farm size to earn an income comparable to that which could be earned in the off-farm sector. In postwar Japan, a poorly functioning land rental market due to rent controls and other government interventions was one of the major reasons for the persistence of a large cohort of small-scale, inefficient, part-time farmers (Hayami 1988; Otsuka 1992). Thus, the development of well-functioning land markets should be one of the important policy goals that, in addition to other things, can mitigate intersectoral income disparity, especially in the case of emerging middle-income countries (World Bank 2007).

At the same time it is also known that, if at least one of the three factor markets (i.e. the markets for labor, land sales, or land rental) functions com-

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petitively under the assumption of constant returns to scale, an efficient allocation of resources can be achieved (Kevane 1996). However, due to the high cost of monitoring farm work, farm labor markets are almost always thin, confining the use of hired labor to simple tasks (Hayami and Otsuka 1993). As a consequence, care-intensive activities, such as water management and fertilizer application, are nearly exclusively carried out by family labor. Likewise, land sales markets are not expected to function competitively as a means to facilitate land reallocation across households because of chronic imperfections in credit markets. Moreover, because land can be used not only for farming but also as collateral enabling access to formal credit markets, 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 labor, land sales, and land rental markets, the land rental market may be the most feasible institution through which resources can be efficiently reallocated across farm households in rural villages (Otsuka 2007; Holden, Otsuka, and Place 2009).

Although the literature on tenancy markets argues that high transaction costs due to the high cost of monitoring the work effort of tenants is the major source of tenancy market failure (Skoufias 1995), the risk of losing the rights of rented-out land can also be potentially a major constraint on the land rental transactions in many areas where individual land rights are not well established (Otsuka and Place 2001). China is no exception. In this country, individual land rights have been weak, and land is frequently reallocated among households in order to adjust changing population structures arising from the out-migration and other demographic shifts involving household members (Benjamin and Brandt 2002). Indeed, land might be expropriated if land is rented out because renting out can be regarded as the sign of a weak demand for land (Brandt et al. 2002).

In order to examine whether the risk of land expropriation is a major constraint on land rental transactions in China, this study constructs a two-period model of the determinants of land rental transactions that explicitly incorporates the risk of land expropriation. Using the model to specify the relationship between the risk of expropriation and land rental, we test this hypothesis by using household survey data that were collected by one of our team members.

In China rapid industrialization has increased the income of the urban nonfarm population, and as a result the income disparity between farmers and nonfarmers has increased significantly (e.g., Rozelle, Huang, and Otsuka 2005). In order to increase farm income in the face of increasing labor costs, the expansion of farm size (along with large-scale mechanization) is necessary

(Hayami and Ruttan 1985). Given China's limited land endowment, it is also important to enhance the efficiency of land allocations among households so as to allow the nation's agricultural sector to keep up with the nation's growing food demand. Several researchers, however, point out that, despite more than decades of market reform, land markets in China still remain underdeveloped (e.g., Lin 1988; Bowlus and Sicular 2003). In order to reduce the income disparity between the farm and nonfarm populations and to raise the efficiency of farm sectors, promoting well-functioning tenancy markets is an important item on the policy agenda.

To accomplish our objectives, this article is organized as follows. Section II presents a two-period, theoretical model of the determinants of land rental transactions and proposes three testable hypotheses. The data set is described and descriptive statistics are provided in Section III. The results of our regression analysis are reported in Section IV. Section V concludes and provides a discussion of the article's policy implications.

II. Conceptual Framework of Land Rental Transactions

Consider a farm household consuming a composite good and enjoying leisure. The household is endowed with \bar{A} units of land and \bar{L} units of time and can produce the agricultural product on its farm according to the concave production function $F(A, L)$, where A is the area of farm land cultivated by the household and L is the amount of labor used on the farm. A major feature of the model is that if the household rents out the whole or a part of its land (i.e., $A < \bar{A}$), the local government (or in the case of China, the local quasi-government unit, the village) may expropriate the area of farm rented out (i.e., $\bar{A} - A$) at the end of the period, so that the household's land endowment in the next period becomes A . The expropriated land will not be kept by the renter but will be reallocated by the local government.¹ For simplicity, we will focus on a two-period case below, but the outcome remains essentially unchanged if the model has more than two periods.

We assume that the household maximizes the expected utility over the two periods, which is given by

$$U = u(c_1, l_1) + E[\beta u(c_2, l_2)], \quad (1)$$

subject to

¹ The decision to reallocate expropriated land is usually made by the local village leader who acts with some discretion. In the literature, it has been argued that leaders tend to favor their own and related families or families with a small area of land compared with the size of family labor (Brandt et al. 2002). In our observation, the probability that the renter receives the land is nil.

$$c_t = F(A_t, L_t) + w(\bar{L} - L_t - l_t) + R_t(\bar{A}_t - A_t),$$

$$t = 1, 2, \quad (2)$$

$$\bar{L} - L_t - l_t \geq 0, \quad t = 1, 2, \quad (3)$$

$$R_t = \delta^N(A_t, \bar{A}_t)(r + \gamma^N) + \delta^O(A_t, \bar{A}_t)(r - \gamma^O),$$

$$t = 1, 2, \quad (4)$$

$$\bar{A}_2 = \begin{cases} A_1 & \text{with probability } p \\ \bar{A}_1 & \text{with probability } 1 - p \end{cases} \quad \text{if } \delta^O(A_1, \bar{A}_1) = 1, \quad (5)$$

$$\bar{A}_2 = \bar{A}_1 \quad \text{if } \delta^O(A_1, \bar{A}_1) = 0. \quad (6)$$

Here $u(c, l)$ is the utility function, c is consumption, l is leisure, and β is a discount factor. The household is assumed to have no access to the credit market. Thus, the consumption in a period is equal to the income in the same period, as equation (2) indicates. While the price of the composite good is normalized to unity, the off-farm wage rate is denoted by w and the effective rent received or paid by the household is denoted by R .² Inequality (3) represents the constraint that the time spent by the household working for an off-farm wage, that is, $\bar{L} - L - l$, is nonnegative. It is also assumed that the household cannot hire labor for cultivating its own farm because of the prohibitively high cost of hired labor.³

In equation (4), it is assumed that there are proportional transaction costs. Such transaction costs have been considered in the literature on farmer participation in food and labor markets (e.g., de Janvry, Fafchamps, and Sadoulet 1991; Goetz 1992; Key, Sadoulet, and de Janvry 2000). The idea of proportional transaction costs may apply to land rental markets, particularly in China,

² Although we do not analyze the migration decision explicitly, it can be easily incorporated into the model by specifying the migration cost. Such an expanded model allows farm household members to be engaged in off-farm jobs through rural-urban migration.

³ Care-intensive tasks in agricultural production, such as water control and fertilizer application, are rarely performed by hired labor because of the difficulty of monitoring such tasks for the employer. In general, the term of the hired agricultural labor is expected to be short (a few days), and the tasks are simple and observable, such as transplanting and weeding (Hayami and Otsuka 1993). Thus, this study excludes this casual labor market from the formal analysis. Although the data show that around 10% of the sample households hired outside labor, the proportion of hired labor in the household's total labor input is only 2.1% on average, and such hiring is limited to the peak season.

where landholding per farm household is so tiny that the number of land transactions tends to increase with an increase in transacted land areas. That is, search and negotiation costs associated with land rental transactions are expected to increase with the area of land to be rented in or out. Let γ^N denote the per-unit transaction cost associated with renting in and γ^O that associated with renting out. Thus, $r + \gamma^N$ is the rent effectively paid by the household when it rents in land, and $r - \gamma^O$ is the rent effectively received by the household when it rents out land. The land renting behavior of the household can be characterized by two indicator functions: $\delta^N(A, \bar{A})$, which is equal to one if $A > \bar{A}$ (renting in) and zero otherwise, and $\delta^O(A, \bar{A})$, which is equal to one if $A < \bar{A}$ (renting out) and zero otherwise. Equations (5) and (6) represent the following: renting out causes land expropriation by the local government with probability p ; if expropriation occurs, the household in the second period will be endowed with the area cultivated by the household itself in the first period, that is, A_1 ; if the household did not rent out in the first period, it will be endowed with \bar{A}_1 in the second period with certainty. In the second period, there is no longer an expropriation risk even if the farm is rented out.⁴

The maximization problem can be solved by using backward induction, starting with the second-period choice of c_2, A_2, L_2 , and l_2 and taking \bar{A}_2 as given, whether it is equal to \bar{A}_1 or $A_1 (< \bar{A}_1)$. The maximized utility level in the second period is given by

$$V(\bar{A}_2) = \max u\{F(A_2, L_2) + w(\bar{L} - L_2 - l_2) + R_2(\bar{A}_2 - A_2), l_2\}$$

subject to $\bar{L} - L_2 - l_2 \geq 0,$ (7)

where R_2 is given by equation (4). The first-order conditions are

$$F_1(A_2, L_2) = r + \gamma^N,$$

$$A_2 > \bar{A}_2 \text{ if } F_1(\bar{A}_2, L_2) > r + \gamma^N, \tag{8}$$

$$A_2 = \bar{A}_2 \text{ if } r + \gamma^N \geq F_1(\bar{A}_2, L_2) \geq r - \gamma^O, \tag{9}$$

$$F_1(A_2, L_2) = r - \gamma^O \text{ and } A_2 < \bar{A}_2 \text{ if } r - \gamma^O > F_1(\bar{A}_2, L_2), \tag{10}$$

$$F_2(A_2, L_2) = u_2(c_2, l_2)/u_1(c_2, l_2), \tag{11}$$

⁴ This assumption is not unrealistic if we consider that one period in our model corresponds to a decade or so, as the Chinese government has strengthened the individual use rights of land over time.

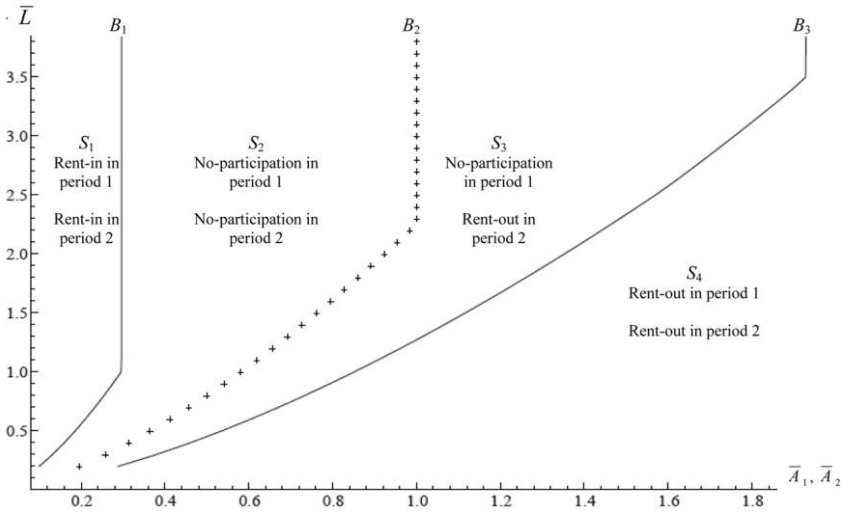


Figure 1. Land rental market participation

$$F_2(A_2, L_2) - w \geq 0 \text{ and } \bar{L} - L_2 - l_2 \geq 0$$

with complementary slackness, (12)

where F_i and u_i , $i = 1, 2$, are the partial derivatives of the production and utility functions with respect to their i th variable and c_2 and R_2 are given by equations (2) and (4), respectively. Equations (8), (9), and (10) imply that the household rents in or out land or stays away from land rental transactions, depending on whether the marginal product of land evaluated at \bar{A}_2 is higher than $r + \gamma^N$ or lower than $r - \gamma^O$ or between them. As equations (11) and (12) show, the optimal time allocation requires the equality between the marginal product of farm labor input and the marginal rate of substitution between leisure and consumption, which are equal to w if the household supplies labor to the off-farm sector but higher than w if the labor endowment of the household is sufficiently small so that the household spends no time working for the off-farm wage.

Figure 1 illustrates the relationship between land rental market participation behavior and the endowments of land and labor.⁵ For the moment, the hor-

⁵ In this figure, the boundary curves are graphed under the following assumptions: the production function is of the Cobb-Douglas type, $F(A, L) = A^{0.4}L^{0.4}$; the utility function is also of the Cobb-Douglas type, $u(c, l) = 2\ln c + \ln l$; the discount factor and the probability of expropriation are $\beta = 0.8$ and $p = 0.25$, respectively; the wage rate and the market rent are $w = 0.4$ and $r = 0.5$, respectively; and the proportional transaction costs are $\gamma^N = \gamma^O = 0.1$. Although not drawn in the figure, if there are no proportional transaction costs, there is only one boundary curve, which is vertical at $\bar{A}_1 = 0.648$. We assume that the production function is subject to decreasing returns to scale because of the absence of large-scale mechanization and the dominance of scattered landholdings in China.

horizontal axis in the figure measures \bar{A}_2 , even though it will measure \bar{A}_1 as well when we analyze the situation in the first period below. The first quadrant of the (\bar{A}_2, \bar{L}) plane is divided by two boundary curves, B_1 and B_2 , into three segments, S_1, S_2 , and $S_3 + S_4$. The household chooses renting in if endowment (\bar{A}_2, \bar{L}) falls within S_1 , no rental market participation in the case of S_2 , and renting out in the case of $S_3 + S_4$. The boundary curves are upward sloping for small labor endowments and vertical for large labor endowments.⁶ Below the upward-sloping part of B_2 , the household's work time is fully devoted to farming and still it is not enough to cultivate the whole area of \bar{A}_2 , so that the household rents out a part of \bar{A}_2 .

It should be clear that the maximized utility V in period 2 is an increasing function of \bar{A}_2 , which is equal to either A_1 or \bar{A}_1 . By the envelope theorem, the derivative of V is

$$V'(\bar{A}_2) = u_1(c_2, l_2)R_2. \tag{13}$$

With the V function, the whole maximization problem is written as

$$\max \{u(c_1, l_1) + \delta^o(A_1, \bar{A}_1)\beta[pV(A_1) + (1 - p)V(\bar{A}_1)] + (1 - \delta^o(A_1, \bar{A}_1))\beta V(\bar{A}_1)\} \tag{14}$$

subject to

$$c_1 = F(A_1, L_1) + w(\bar{L} - L_1 - l_1) + R_1(\bar{A}_1 - A_1), \tag{15}$$

$$\bar{L} - L_1 - l_1 \geq 0. \tag{16}$$

If the household did not rent out its farm land in the first period (i.e., $\delta^o(A_1, \bar{A}_1) = 0$), the problem is to maximize $u(c_1, l_1) + \beta V(\bar{A}_1)$ subject to constraints (15) and (16). Since the second-period utility does not depend on the decision made in the first period, the problem in this case is equivalent to the static optimization problem (7).

If (part of) the farm is rented out in the first period ($\delta^o(A_1, \bar{A}_1) = 1$), the size of farm cultivated by the household is given by the first-order condition

$$u_1(c_1, l_1)\{F_1(A_1, L_1) - (r - \gamma^o)\} + \beta p V'(A_1) = 0, \tag{17}$$

where the second term is the expected future marginal gain. Using (13) and noting that $R_2 = r - \gamma^o$ in this case, we have

⁶ There is a unique pair (A^*, L^*) that satisfies $F_1(A^*, L^*) = r + \gamma^N$ and $F_2(A^*, L^*) = w$. There is also a unique value of l^* that satisfies $u_2(F(A^*, L^*), l^*) / u_1(F(A^*, L^*), l^*) = w$. Boundary B_1 has a kink at point $(A^*, L^* + l^*)$. For labor endowment greater than $L^* + l^*$, the boundary on which land endowment is equal to A^* is vertical at A^* . Similarly, boundary B_2 has a kink at point $(A^{**}, L^{**} + l^{**})$ at which $F_1(A^{**}, L^{**}) = r - \gamma^o$, $F_2(A^{**}, L^{**}) = w$, and $u_2(F(A^{**}, L^{**}), l^{**}) / u_1(F(A^{**}, L^{**}), l^{**}) = w$.

$$V'(A_1) = u_1(\hat{c}_2, \hat{l}_2)(r - \gamma^o), \quad (18)$$

where $u_1(\hat{c}_2, \hat{l}_2)$ on the right-hand side is the marginal utility of consumption in the second period in the case of expropriation. Substituting and rearranging, we obtain

$$F_1(A_1, L_1) = (r - \gamma^o) \left[1 - \beta p \frac{u_1(\hat{c}_2, \hat{l}_2)}{u_1(c_1, l_1)} \right]. \quad (19)$$

That is, the marginal product of land, F_1 , is not equated with the effective rent $r - \gamma^o$ that the household receives but with a fraction of $r - \gamma^o$ because of the expropriation risk. This fraction is smaller if the discount factor is larger, the probability of expropriation is higher, and the marginal rate of substitution between the current consumption and the future consumption after expropriation is higher. Because the marginal product of land is decreasing, equation (19) indicates that the expropriation risk reduces the area rented out.

Figure 1 illustrates how the expropriation risk discourages households from renting out their lands. While the boundary between renting out and no participation in the land rental market is B_2 in the absence of the risk, it is B_3 in the presence of the risk, indicating that the risk discourages the households whose (\bar{A}_1, \bar{L}) falls within segment S_3 from renting out completely and reduces the areas rented out by the households whose (\bar{A}_1, \bar{L}) falls within segment S_4 .

Based on the outcomes of the model, we advance the following testable hypothesis:

HYPOTHESIS 1. The perception of tenure insecurity reduces the likelihood of renting out land and the area of farm rented out.

Given land endowment and the expropriation risk, the incentive to rent out land depends on the size of the labor resource and its education level. As the education level of a worker increases, his or her off-farm wage rate rises. A higher wage rate makes off-farm activities more attractive and increases the incentive to rent out land. In figure 1, an increase in the wage rate shifts the vertical parts of boundaries B_1 and B_2 to the left and extends them downward until they reach the upward-sloping parts, whose locations are not affected by the increase in the wage rate.⁷ The steeper (but not vertical) part of boundary B_3 also moves to the left when the wage rate increases. As long as the off-farm wage rate is positively associated with the education level, households

⁷ The upward-sloping parts of the boundaries are not affected by the increase in the wage rate because the household with such a small labor resource is not supplying labor to the off-farm sector.

with highly educated members will have a stronger incentive to rent out land for a given land endowment and a given number of family workers. Thus, it seems reasonable to hypothesize as follows:

HYPOTHESIS 2. The likelihood of renting out land and the area of farm rented out tend to increase as the number of family workers decreases and their education level increases, whereas the opposite applies to the likelihood of renting in and the area rented in.

III. Data and Descriptive Analysis

Our empirical analysis uses household data collected in 2000 by a team of researchers from the Center for Chinese Agricultural Policy (CCAP) in Beijing, the University of Toronto, and the University of California, Davis. The data set covers 60 randomly selected villages that were chosen from the list of all the villages in six representative provinces: Hebei, Liaoning, Shanxi, Zhejiang, Hubei, and Sichuan. In each village, 20 sample households were randomly selected.⁸ The sample as a whole consists of 1,200 households. The data set contains rich information on land rental transactions, land endowment and labor endowment at the farm household level, and the frequency of land reallocations in the past at the community level, which is related to tenure insecurity. Also asked was whether the farmer perceived the risk of future land reallocation by village leaders. Specifically, respondents were asked whether they had certain expectations about not having their land subject to reallocations in the coming 30 years (for a reason that will be described below).⁹

A. Human Resources

Table 1 describes a set of variables that can be used to measure a household's land, labor, and other resources. On average, a household has 3.6 adult members. Those older than age 65 account for around 7% of adult members, and those younger than age 34 account for 45%. More than half of the adult members completed primary education, and more than 30% of the adult members completed secondary education. Note, however, that the sample provinces differ in school attainment. While 67% of adults completed primary education and 46% completed secondary education in Shanxi, the percentages are only 44% and 23%, respectively, in Hubei, where the average school attainment is the lowest in our sample.

⁸ The households were randomly chosen from a comprehensive list compiled by the village accountant. The list included all households—both those that were farming and those that were not, although the latter were very few. The sample was not stratified.

⁹ The reason why the 30-year period does matter is explained later in this section.

TABLE 1
DESCRIPTION OF HOUSEHOLD RESOURCES

	All	Hebei	Liaoning	Shanxi	Zhejiang	Hubei	Sichuan
No. adults	3.64 (1.57)	3.79 (1.48)	3.63 (1.70)	3.51 (1.41)	3.90 (1.63)	3.62 (1.54)	3.60 (1.61)
No. males of ages:							
20–34	.78 (.81)	.75 (.76)	.82 (.82)	.71 (.76)	.82 (.91)	.75 (.81)	.84 (.81)
35–49	.61 (.62)	.62 (.61)	.59 (.60)	.61 (.61)	.65 (.68)	.56 (.58)	.62 (.64)
50–64	.30 (.47)	.28 (.45)	.31 (.46)	.33 (.49)	.34 (.50)	.28 (.46)	.26 (.44)
65 or older	.15 (.38)	.14 (.34)	.12 (.32)	.14 (.41)	.14 (.37)	.23 (.43)	.13 (.36)
No. females of ages:							
20–34	.85 (.94)	.85 (.98)	.87 (1.04)	.72 (.88)	.95 (1.04)	.83 (.76)	.88 (.91)
35–49	.62 (.58)	.69 (.64)	.57 (.58)	.65 (.53)	.69 (.54)	.55 (.60)	.55 (.55)
50–64	.23 (.43)	.26 (.44)	.25 (.44)	.25 (.43)	.21 (.42)	.22 (.41)	.22 (.42)
65 or older	.1 (.35)	.2 (.41)	.1 (.29)	.1 (.34)	.1 (.31)	.2 (.38)	.1 (.35)
Proportion of adults who completed primary education	.53 (.38)	.46 (.38)	.54 (.39)	.67 (.35)	.51 (.36)	.44 (.37)	.55 (.37)
Proportion of adults who completed secondary education	.31 (.34)	.24 (.31)	.31 (.33)	.46 (.37)	.30 (.33)	.23 (.32)	.30 (.33)
Value of agricultural production asset (yuan)	417.4 (651.9)	823.7 (1,061.9)	404.3 (618.4)	478.3 (653.6)	185.2 (424.4)	281.3 (316.7)	364.2 (398.9)
Proportion of adults engaged in off-farm employment	.60 (.43)	.59 (.45)	.58 (.42)	.50 (.40)	.73 (.42)	.56 (.43)	.64 (.42)
Daily farm earning per family worker (yuan)	7.9 (16.8)	8.1 (11.0)	4.9 (6.7)	13.7 (31.9)	1.3 (19.2)	6.2 (8.5)	4.4 (5.0)
Daily off-farm wage (yuan)	27.3 (11.5)	26.3 (13.5)	21.2 (6.05)	29.6 (9.7)	31.6 (7.6)	21.0 (4.0)	34.0 (16.3)

Note. Values in parentheses are standard deviations.

B. Off-Farm Employment

Although more than 80% of the adults were engaged in some type of farm work, either full time or part time, the nonfarm labor market only emerged in China in the past 2 decades, It offers relatively lucrative employment opportunities outside family farming (de Brauw et al. 2002).¹⁰ Indeed, 60% of adults reported some form of off-farm employment; a quarter of them migrated

¹⁰ Our data show that off-farm employment provides 3.5 times higher daily earnings than farm labor employment on average.

to locations beyond the immediate vicinity of the village to obtain off-farm jobs.¹¹ Among our sample provinces, Zhejiang province has by far the highest rate of participation in the off-farm labor market (73%), and this is followed by Sichuan province (64%). Although Shanxi province has the lowest off-farm employment rate, half of the adults still worked off the farm.

C. Land Reallocations

In the early 1980s, when the Household Responsibility System (HRS) was being promoted, almost all farmers were given land use rights, which were good for 15 years.¹² The de facto ownership of the land, however, belonged to the local village, and village leaders could reallocate land to control the behavior of farmers (e.g., Rozelle and Boisvert 1995). In the late 1990s, as the first 15-year land contract was coming to an end, China's top leadership made two directives regarding the management of cultivated land. First, local governments were encouraged to organize village leaders and help them reallocate land among households in each village to redress imbalances in access to cultivated land that had arisen from the previous 15 years due to demographic and other factors. Village-wide reallocations were supposed to set the stage for the next part of the directive: extension of the land contract period for 30 years, during which time landholdings were supposed to be fixed. It is important to note that in the late 1990s these national policy directives were not law-based regulations—as was the Rural Land Contracting Law, which was passed by the National Peoples Congress in 2003 (a time after the survey collected data for this study)—they were only policy pronouncements.

Therefore, while this was a national directive, the reality for cultivated land management in China was that local governments retained a lot of control over the land and would often insulate villages from national policy directives (Brandt 2002; Schwarzwald et al. 2002). Due to this policy space created by the decentralized nature of central-local relations during the 1990s, local governments took actions in two broad forms. In some cases, they followed the national policy closely, directing villages to reallocate cultivated land among all households and then issue 30-year land contracts based on the new dis-

¹¹ In this study, an adult member is considered to have migrated if he or she worked (and lived) away from home for more than 6 months in the sample year.

¹² Due to the failure to promote agricultural production through a collective farming system (in which a group of farmers formed a production team and shared the residual profits depending on the work points that they earned (Lin 1992) during the socialist period in China (1949–78), the Chinese government made a monumental decision in 1978 (Lardy 1983). Between 1978 and 1983, officials decollectivized production teams (subunits of today's villages) and granted land use rights and residual income rights to individual farmers. This system was called the Household Responsibility System, and it was almost ubiquitously adopted.

tributions. In other cases, however, local governments chose to allow their villages to continue to operate in a business-as-usual environment, a system that is described by Brandt (2002).

In the business-as-usual environment, villages were allowed to make adjustments when they believed it was appropriate to do so. In such villages, many different methods of land management were allowed—in some villages, land reallocations were made on a case-by-case basis (i.e., if one family lost a member—to say marriage out of the village of a daughter—and another family gained a member—to say a new birth of a granddaughter), an idiosyncratic adjustment could be made by village leaders (i.e., by transferring a piece of land from the family whose daughter married out to the family that had just gained a granddaughter); in other villages, the right to adjust was given to the small group (a subvillage administrative unit), and while leaders of some small groups adjusted their land allocations, others did not. Kung, Lin, and Shen (2004) find that administrative land reallocations arose from more than simple demographic factors. Brandt, Rozelle, and Turner (2004) demonstrate that while over time household size has become less important as a determinant of land reallocations, economic efficiency (for reasons such as the effect of land reallocations on off-farm labor income) has become a more important concern of village leaders. Regardless of the exact approach to land management that villages adopted in the business-as-usual regions of the country, the result of such a system was that land reallocations were much less systematic and more opaque. Li, Rozelle, and Brandt (1998), Brandt et al. (2002), Jacoby, Li, and Rozelle (2002), and Deininger and Jin (2003) argue that such land reallocations have created a perception of land tenure insecurity for farm households. Deininger et al. (2004) find that only 12% of farmers expected no reallocations in the future and that many farmers were uncertain about future reallocations in their villages.

In our sample, 99.8% of households have land use rights. The average farm size of sample households is small—only 7.7 mu, as shown in table 2.¹³ While the typical household in Hebei and Shanxi provinces cultivates 12.9 mu and 11.8 mu, respectively, the average sample household in Hubei and Zhejiang provinces only cultivates between 4.1 mu and 4.4 mu, respectively. Since the introduction of the HRS, 75% of households have experienced land reallocations. In Hebei, Shanxi, and Zhejiang provinces, more than 90% of households experienced land reallocations. The percentage of households experiencing land reallocation, however, is less than 50% in Hubei and Sichuan provinces. The “proportion of households that perceive tenure insecurity,”

¹³ One mu is equivalent to 0.067 ha.

TABLE 2
LAND ENDOWMENT, REALLOCATIONS, AND RENTAL TRANSACTIONS BY PROVINCE

	All	Hebei	Liaoning	Shanxi	Zhejiang	Hubei	Sichuan
Land endowment (mu)	7.7 (9.47)	12.9 (14.59)	7.7 (5.27)	11.8 (10.86)	4.4 (4.30)	4.1 (3.02)	5.6 (9.13)
Proportion of households that experienced reallocations	.75 (.32)	.94 (.09)	.83 (.31)	.93 (.12)	.93 (.19)	.41 (.26)	.49 (.33)
Proportion of households that perceive tenure insecurity	.90 (.30)	.99 (.10)	.99 (.07)	.81 (.39)	.61 (.49)	.99 (.001)	.99 (.12)
Proportion of households that rent in land	.19 (.39)	.19 (.39)	.12 (.33)	.24 (.43)	.39 (.49)	.07 (.25)	.11 (.32)
Proportion of households that rent out land	.12 (.33)	.11 (.31)	.07 (.25)	.13 (.33)	.24 (.43)	.09 (.29)	.08 (.28)
Area of land rented in (mu)	.6 (2.33)	1.0 (3.70)	.2 (.73)	1.2 (3.55)	.8 (1.87)	.1 (.66)	.2 (.97)
Area of land rented out (mu)	.3 (1.31)	.5 (2.05)	.1 (.53)	.4 (1.99)	.4 (.84)	.1 (.58)	.2 (.82)
Proportion of land rented	.05 (.15)	.05 (.12)	.02 (.10)	.07 (.17)	.13 (.22)	.01 (.06)	.04 (.15)

Note. Values in parentheses are standard deviations.

shown in the third row of table 2, is the across-village average of the proportion of households that are not sure that the local government will fix the allocation of land in the village until the end of the 30-year contract. When considering the entire sample, on average, 90% of households in the sample were uncertain as to the whether or not reallocations would occur in the coming 30 years; 10% were sure that the next land reallocation would be implemented only after the 30-year contract period had elapsed.¹⁴ In Hebei, Liaoning, Hubei, and Sichuan, tenure insecurity was perceived by almost all households. By contrast, households in Zhejiang and Shanxi were much more confident of their tenure security; tenure insecurity was perceived only by 61% of households in Zhejiang and 81% in Shanxi.

D. Land Rental Transactions

Sharecropping is rarely observed in China. Although tenancy transactions were not illegal under the Household Responsibility System, the land rental market was almost nonexistent throughout the 1980s (Brandt 2002). In the 1990s, however, land rental transactions increased as off-farm labor markets began to emerge in rural China because off-farm job opportunities created incentives for farmers to rent out their land (Kung 1995; Deininger and Jin 2005).

¹⁴ Consistent with this, Schwarzwalder et al. (2002) find that, in 1999, 12.7% of households expected no more reallocations during the 30-year land use term.

TABLE 3
LAND ENDOWMENT PER ADULT FAMILY MEMBER RENTAL TRANSACTIONS, 2000

Land Endowment per Adult	Percentage of Households			Average Area of Land (Mu)	
	Renting In	No participation	Renting Out	Rented In	Rented Out
0–20th percentile	19.4	73.1	8.3	1.05	.34
20th–40th percentile	18.8	71.4	11.1	.48	.28
40th–60th percentile	16.5	71.6	12.8	.64	.24
60th–80th percentile	15.4	75.9	9.5	.57	.28
Top 20% group	23.7	62.7	18.6	.60	.36

Although the incidence of land rental transactions across households in sample villages is still low, as Rozelle et al. (2005) attest, it has been increasing. Brandt et al. (2002) find that less than 1% of the land across China was rented in and only 2% of households rented in or out their land in 1988. In our data, 19% of households rented in and 12% rented out their land; the rented land accounted for 5% of the land cultivated, as is shown in table 2.¹⁵ Among the sample provinces, land rental markets are the most active in Zhejiang and the least active in Hubei.

Table 3 relates land rental transactions to the distribution of land endowment per adult family member within villages. Households in each sample village are classified into five groups of equal sample size according to their land endowment per adult. In the group with the smallest land endowment per adult in the villages, 19.4% of the households, on average (over all the sample villages), rented in their land, 73.1% neither rented in nor rented out, and 8.3% rented out their land in 2000. The percentage of households that rented in was smaller for groups with larger land endowment per adult except for the top 20% group. The percentage of households that rented out their land tended to increase with land endowment per adult. These observations are consistent with hypothesis 2. From table 3 as a whole, however, it is not clear how tenancy outcomes and land endowment are related.

IV. Regression Analysis

In this section, we explore the determinants of tenancy market participation by means of reduced-form regressions. The estimates of the functions explaining

¹⁵ In our study, land rental includes all tenancy transactions. In China, most rental transactions are carried out with the leaseholder providing some type of consideration to the renter prior to the start of the contract. In some cases, the consideration is paid in cash. In-kind payments are also used (although it is still a fixed rent paid prior to the cropping year). In some cases, where the land rent is low, there is no rent charged, but the leaseholder typically has to pay the land taxes and fees. In some cases, the renter pays the taxes and fees; in other cases, they are paid by the leaseholder.

renting in and renting out are reported in tables 4 and 5, respectively. On the right-hand side of the regression equations are variables representing household characteristics, village characteristics, and provincial-level fixed effects. In another specification, village characteristics and provincial-level fixed effects are superseded by village-level fixed effects. Toward the end of this section, we will use the same set of right-hand-side variables to estimate a linear probability model for the perceived tenure insecurity.

To measure the labor endowment of a household, we use the number of adult household members. Note that this variable includes those who have migrated, and hence it can be regarded as exogenous. Among the village characteristics included in regressions is the standard deviation of land endowment per adult household member. This variable is intended to capture the inequality of land distribution in the village, but it may fail to serve this purpose fully. Thus, we ran supplementary regressions that include the standard deviation of land endowment itself, the ratio of the 80th percentile to the 20th percentile of land endowment, and a similar ratio of land endowment per adult. We also controlled for the effects of the location of the household in the distribution of land in the village by inserting the ranking of the household in the land distribution. It turned out, however, that these additional controls had significant effects or affected the estimates of the effects of the other variables only in a few exceptional cases, so the results for these are not shown in this article.

In the first three columns of table 4, the dependent variable is the area rented in. In the last three columns, it is the dummy variable indicating whether or not the household rents in land, regardless of the area rented in. Columns 1, 2, 4, and 5 include provincial-level fixed effects, whereas columns 3 and 6 include village-level fixed effects. The estimator used in the first three columns is ordinary least squares; this could be replaced by the tobit estimator without changing the qualitative results. The next three columns are specified as the linear probability model; these results remain qualitatively unchanged when the Probit model is applied.

In columns 1–3, the number of adult males younger than age 65 and that of females younger than age 50 have positive effects on the area rented in. The effect of aged family members, who work less than young members, is negative even though it is insignificant. These results are consistent with hypothesis 2 that the households with abundant labor endowment relative to land endowment tend to rent in land. The proportion of highly educated adults has negative and significant effects in columns 4–6, which is also consistent with hypothesis 2. In columns 4–6, however, the number of male adults and the number of young female adults have negative coefficients in the linear

TABLE 4
ESTIMATED MODELS FOR RENTING IN

Explanatory Variable	Area Rented In			Renting In Dummy		
	(1)	(2)	(3)	(4)	(5)	(6)
Household characteristic: Land endowment ($\times 10^{-2}$)	.505 (.33)	.522 (.35)	.327 (.21)	-.063 (-.42)	-.066 (-.45)	-.078 (-.53)
No. males of ages: 20-34	.228 (1.31)	.230 (1.32)	.168 (.93)	.015 (.86)	.014 (.85)	.0002 (.01)
35-49	.520* (1.99)	.519* (1.99)	.401 (1.49)	-.023 (-.88)	-.022 (-.86)	-.053* (-2.03)
50-64	.202 (.57)	.195 (.56)	.149 (.41)	-.006 (-.19)	-.006 (-.17)	-.017 (-.48)
65 or older	-.241 (-.68)	-.249 (-.70)	-.292 (-.80)	-.062 ⁺ (-1.76)	-.060 ⁺ (-1.72)	-.054 (-1.52)
No. females of ages: 20-34	.087 (.59)	.090 (.61)	.076 (.49)	-.023 (-1.61)	-.023 (-1.62)	-.027 ⁺ (-1.79)
35-49	.130 (.52)	.136 (.54)	.174 (.67)	.038 (1.53)	.037 (1.49)	.047 ⁺ (1.90)
50-64	-.068 (-.19)	-.068 (-.19)	-.032 (-.09)	.026 (.74)	.027 (.76)	.022 (.61)
65 or older	-.550 (-1.53)	-.542 (-1.51)	-.457 (-1.24)	-.053 (-1.51)	-.054 (-1.53)	-.056 (-1.55)
Proportion of adults with more than 9 years of schooling	-.357 (-.85)	-.347 (-.82)	-.404 (-.92)	-.087* (-2.10)	-.088* (-2.14)	-.093* (-2.17)

Value of agricultural production assets (1,000 RMB)	.198 (1.01)	.203 (1.04)	.253 (1.24)	.035 ⁺ (1.82)	.035 ⁺ (1.81)	.043* (2.17)
Household experience of land reallocations		.118 (.36)	-.036 (-.08)		-.038 (-1.17)	-.015 (-.36)
Village characteristics:						
Proportion of households that experienced reallocation	.388 (.73)			-.056 (-1.09)		
Average male off-farm wage rate in the village (1,000 RMB)	1.557** (2.71)	1.518** (2.65)		.110* (1.97)	.113* (2.02)	
Village average of land endowment per adult	.243** (2.48)	.249* (2.55)		.014 (1.48)	.014 (1.44)	
Standard deviation of land endowment per adult	-.019 (-.29)	-.027 (-.41)		-.017** (-2.70)	-.017** (-2.67)	
Province fixed effects	Yes	Yes	No	Yes	Yes	No
Village fixed effects	No	No	Yes	No	No	Yes
R ²	.04	.04	.01	.02	.03	.01

Note. The dependent variable is the area rented in, shown in cols. 1–3 and a dummy variable that is equal to one if a part or the whole of the farm is rented in and zero otherwise, shown in cols. 4–6. *N* = number of observations = 1,017. Numbers in parentheses are *t*-statistics.

⁺ Statistically significant at the 10% level.

* Statistically significant at the 5% level.

** Statistically significant at the 1% level.

TABLE 5
ESTIMATED MODELS FOR RENTING OUT

Explanatory Variable	Area Rented Out			Renting Out Dummy		
	(1)	(2)	(3)	(4)	(5)	(6)
Household characteristics:						
Land endowment ($\times 10^{-2}$)	-.230 (-.71)	-.220 (-.68)	-.179 (-.55)	-.117 (-1.12)	-.112 (-1.08)	-.089 (-.86)
No. males of ages:						
20-34	-.016 (-.42)	-.015 (-.39)	.013 (.33)	-.009 (-.78)	-.009 (-.74)	.004 (.29)
35-49	.168** (3.00)	.166** (2.98)	.191** (3.30)	.044* (2.44)	.043* (2.40)	.050** (2.71)
50-64	.103 (1.36)	.100 (1.33)	.111 (1.43)	.004 (.17)	.003 (.12)	.005 (.20)
65 or older	.106 (1.39)	.102 (1.34)	.123 (1.57)	.020 (.81)	.018 (.73)	.025 (1.01)
No. females of ages:						
20-34	.042 (1.32)	.043 (1.36)	.030 (.91)	.016 (1.56)	.016 (1.60)	.011 (1.04)
35-49	-.091+ (-1.68)	-.088 (-1.63)	-.098+ (-1.77)	-.030+ (-1.71)	-.028 (-1.63)	-.031+ (-1.76)
50-64	-.156* (-2.01)	-.157* (-2.02)	-.161* (-2.01)	-.017 (-.68)	-.017 (-.70)	-.016 (-.64)
65 or older	.040 (.52)	.043 (.56)	.056 (.71)	.006 (.25)	.008 (.31)	.008 (.32)
Proportion of adults with more than 9 years of schooling	.168+ (1.87)	.173+ (1.92)	.092 (.97)	.049+ (1.70)	.052+ (1.78)	.020 (.66)
Value of agricultural production assets (1,000 RMB)	.010 (.24)	.012 (.28)	-.017 (-.38)	-.002 (-.18)	-.002 (-.14)	-.004 (.29)

Household experience of land reallocations		.087 (1.22)	.025 (.26)	.044 ⁺ (1.91)	.018 (.61)
Village characteristics:					
Proportion of households experienced reallocation	.191 ⁺ (1.68)				
Average male off-farm wage rate in the village (1,000 RMB)	.487** (3.95)	.472** (3.85)		.219** (5.56)	
Village average of land endowment per adult	.036 ⁺ (1.74)	.039 ⁺ (1.86)		-.001 (-.08)	
Standard deviation of land endowment per adult	-.011 (-.76)	-.014 (-.98)		.004 (.96)	
Province fixed effects	Yes	Yes	No	Yes	No
Village fixed effects	No	No	Yes	No	Yes
R ²	.05	.05	.02	.08	.02

Note. The dependent variable is the area rented out, shown in cols. 1–3 and the dummy variable that is equal to one if a part or the whole of the farm is rented out and zero otherwise in cols. 4–6. *N* = number of observations = 1,017. Numbers in parentheses are *t*-statistics.

⁺ Statistically significant at the 10% level.

* Statistically significant at the 5% level.

** Statistically significant at the 1% level.

probability model. These results suggest that something other than the economic force highlighted by hypothesis 2 is also at work. Probably one factor is the tendency that a larger area of land was allocated to households with a larger number of household members. Another factor is the migration of males in their prime and young female adults over an extended period. Increases in the number of such adults may lead to larger land endowment and smaller labor supply to farming, thereby decreasing the probability with which the household rents in land.

Two variables are used to capture land reallocation experiences. One is a dummy variable that is equal to unity if the household was involved in land reallocation. The other is the proportion of households that experienced land reallocations in the village. According to table 4, neither variable has a significant effect on renting in. The average off-farm wage rate has a positive and significant effect on renting in. A higher off-farm wage rate is expected to induce households to reallocate labor time away from farming to off-farm activities, which would result in an increase in renting out and a decrease in renting in with other things being unchanged. To the extent that the land rental market is closed within the village, however, renting out and renting in cannot change in opposite directions, and we do not have a priori prediction about the direction of their changes. We will return to this point later. The village average of land endowment per adult family member has positive and significant effects on the area rented in. This may be because in villages where average land endowment per adult is large, those who would like to rent in land will not have to search for and negotiate with a large number of potential transaction partners. The standard deviation of the land distribution has no significant effect on the area rented in, but it has a negative and significant effect on the likelihood of renting in. The latter effect, however, is insignificant if we use alternative measures of the land inequality, such as the standard deviation of land endowment and the ratio of the 80th percentile to the 20th percentile of the land endowment, as well as the similar ratio of land endowment per adult.¹⁶

Table 5 reports the estimation results for the renting-out equations. The specification of the renting-out equations is the same as the renting-in equations in table 4. Among the adult members of a household, females in their late thirties to mid-sixties are the most unlikely to migrate to remote areas to work. The negative effects of the number of such females on the area rented out and the probability of renting out are consistent with hypothesis 2 that

¹⁶ The other parts of table 4, as well as tables 5 and 6, remain unchanged when these alternative measures of land inequality are included in regression.

the households with abundant land endowment relative to family labor tend to rent out land. The positive and significant effects of the proportion of highly educated adults are also consistent with this hypothesis.

The village-level experience of land reallocations has positive and significant effects on the area rented out in column 1 and the likelihood of renting out in column 4. The household-level experience has a significant effect on the likelihood of renting out when provincial-level fixed effects are imposed, as shown in column 5, but not when village-level fixed effects are imposed, as shown in column 6. The effect of the off-farm wage rate on renting out is positive and highly significant. Since its effect on renting in is also positive and significant, as shown in table 4, we may say that a village with a high average off-farm wage rate tends to have more active land rental transactions. The village average of household land endowment per adult has a positive and marginally significant effect on the area rented out. This result is consistent with our previous argument that land rental transaction costs are lower in villages where farm sizes are larger.

In the past, local governments in some regions in the sample followed national policy closely and implemented major land reallocation systematically. In other regions, however, local governments chose to allow their villages to continue to operate in a business-as-usual environment, and as a result, land reallocations were idiosyncratic and difficult to predict. While it is difficult to prove empirically, we believe that it is plausible that such a system may have had the following outcomes. In regions in which major land reallocations had been implemented systematically, there was reason for many of the households to believe that since their leaders were following national policy, there would not be any more reallocations until the end of the 30-year contract period. The opposite was true in the business-as-usual regions, where, by the nature of China's traditional (pre-policy) cultivated land management system, villagers had a less firm basis on which to form expectations about tenure security. Our expectation is that households should have more secure expectations about not having their land subject to reallocations for the coming 30 years (i.e., they should have more secure tenure) in villages where large shares of households experienced land reallocations than in villages where fewer households were involved in land reallocations. To represent the tenure insecurity perception, we use a dummy variable that is equal to zero if the household is sure that its land will not be reallocated before the end of the 30-year contract period and one if the household is unsure. Its average value in each sample province is shown in table 2.

The estimated linear probability model that explains the tenure insecurity

TABLE 6
ESTIMATED MODELS FOR PERCEIVED TENURE INSECURITY

Explanatory Variable	(1)	(2)	(3)
Household characteristics:			
Land endowment ($\times 10^{-2}$)	-.059 (-.56)	-.065 (-.60)	-.035 (-.36)
No. males of ages:			
20–34	.001 (.09)	.001 (.05)	.006 (.57)
35–49	-.021 (-1.16)	-.021 (-1.13)	-.025 (-1.49)
50–64	-.017 (-.69)	-.016 (-.63)	-.030 (-1.33)
65 or older	-.068** (-2.71)	-.066** (-2.61)	-.055* (-2.42)
No. females of ages:			
20–34	-.015 (-1.44)	-.016 (-1.50)	-.009 (-.93)
35–49	.011 (.62)	.010 (.53)	.031 ⁺ (1.92)
50–64	.027 (1.05)	.027 (1.06)	.026 (1.10)
65 or older	.040 (1.57)	.038 (1.50)	.032 (1.38)
Proportion of adults with more than 9 years of schooling	-.001 (-.03)	-.003 (-.12)	-.007 (-.26)
Value of agricultural production assets (1,000 RMB)	.012 (.84)	.011 (.79)	-.007 (-.56)
Household experience of land reallocations		-.046 ⁺ (-1.95)	-.009 (-.33)
Village characteristics:			
Proportion of households experienced reallocation	-.097** (-2.59)		
Average male off-farm wage rate in the village (1,000 RMB)	-.150** (-3.69)	-.143** (-3.53)	
Village average of land endowment per adult	.009 (1.30)	.008 (1.13)	
Standard deviation of land endowment per adult	.003 (.59)	.004 (.90)	
Province fixed effects	Yes	Yes	No
Village fixed effects	No	No	Yes
R^2	.18	.15	.01

Note. The dependent variable is the dummy variable that is equal to one if land reallocation is expected to take place in the next 30 years and zero otherwise. N = number of observations = 1,017. Numbers in parentheses are t -statistics.

⁺ Statistically significant at the 10% level.

* Statistically significant at the 5% level.

** Statistically significant at the 1% level.

perception is shown in table 6.¹⁷ The household characteristics have generally no significant effects on perceived tenure insecurity. An exception is the negative effect of the number of aged males, which is difficult to explain and reconcile with the positive effect of aged females. Another exception is that land reallocation experience at the household level has a negative and significant effect, as shown in column 2. This effect, however, is completely insignificant when village-level fixed effects are imposed, as shown in column 3. By contrast, the village-level experience of land reallocations has a significant effect, which is consistent with the conjecture discussed above: households' perception of tenure insecurity depends on their perception of the village leaders' attitude toward the national policy. The positive effect of the village-level experience of land reallocations on renting out shown in table 5, together with the negative effect of the experience on the tenure insecurity perception shown in table 6, presents suggestive evidence for the negative impacts of the insecurity perception on land rental transactions (i.e., hypothesis 1), even though we cannot test the hypothesis directly because of the lack of a valid instrument variable.

According to table 6, the average off-farm wage rate in the village has a negative and highly significant effect on the perception of tenure insecurity. In view of this result, the reason why renting in and renting out are more active in villages with higher off-farm wage rates, as shown in tables 4 and 5, seems attributable to tenure security in such villages. Then, a question arises as to why tenure insecurity perception is associated with the average off-farm wage rate in the village. In the context of our model, it is easy to show that tenure insecurity affects a greater number of households adversely if off-farm wage rates are higher. In villages with higher off-farm wage rates, therefore, the local government may be more willing to decrease land tenure insecurity if it cares about the popularity of its policy. To the extent that households take such a political economy effect into account, their tenure insecurity perceptions may be associated with the village's average off-farm wage rate.

V. Summary and Conclusions

Considering that neither farm labor nor land sales markets are expected to function effectively in China (as in many developing countries), the land rental market is likely to be the only practical means for achieving an efficient land allocation across households. When functioning, land rental markets provide benefits for both the farmers who want to dispose of their land to move to nonfarm sectors and those who wish to expand their farm size. Thus, the

¹⁷ The use of the Probit model specification does not change the estimation results qualitatively.

development of well-functioning land rental markets is critically important for facilitating the structural transformation of the economy from an agricultural-based economy to an industrialized one.

In this article, we proposed a theoretical model of land rental transactions. Our basic hypothesis is that one of the major sources of land rental market failure in China is the risk of expropriation of land when land is rented out. Such risk not only impedes the household's farm size adjustment toward an optimal size in the absence of such risk but also discourages households from participating in land rental markets in the first place. The predictions of our model are empirically tested by using household survey data from China. Our estimated results suggest that the unclear land allocation policies of local governments increase the expected risk of land expropriation if land is rented out. In addition, higher off-farm wage rates are found to activate (or at least are correlated with) land rental markets; this is most likely because an increase in off-farm employment opportunities leads to enhanced gains from land rental transactions.

In order to remove the impediments for tenure transactions in China, further strengthening of individual land rights (as well as their protection and enforcement) by local/regional governments is necessary. Under the current administrative land reallocation system, individual land use rights can be taken away, which appears to be thwarting incentives for farmers, including relatively unproductive part-time farmers who cultivate tiny plots of land, to rent out their land. Hence, according to our results, granting and protecting individual land rights on farmland is one of the major remaining institutional reforms that must be implemented in China in order to sustain China's rapid economic transformation.

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