

Off-Farm Labor Markets and the Emergence of Land Rental Markets in Rural China¹

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A nascent land rental market is emerging in rural China after almost two decades of rural reforms. That the timing of its emergence coincides with the acceleration of an off-farm labor market suggests that the development of one factor market may have induced the emergence of the other. Using a recent farm survey, we are able to show that households with active participation in off-farm labor markets, measured by the number of days worked, have indeed rented less land. Contrarily, our analysis fails to substantiate the hypotheses that administrative land reallocations, which is a property of China's land tenure system, and respectively grain quotas, tend to hamper the development of land rental transactions. *J. Comp. Econ.*, June 2002, 30(2), pp. 395–414. Division of Social Science, Hong Kong University of Science and Technology, Clearwater Bay, Kowloon, Hong Kong, China.

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1. INTRODUCTION

A typical feature of large agrarian economies is the tenacious persistence of imperfections in a number of factor markets. Because of this, the development of land rental markets plays a uniquely important role in allocating resources efficiently across farm households, which are the primary production units in these economies. For example, if the credit market for land sales were to operate

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smoothly, a small holder with a productivity advantage in terms of supervision costs over its larger counterpart could choose to own an amount of land commensurate with its household endowments. However, because credit is intimately tied to the amount of land owned and against which collateral is pledged, this arrangement prevents the redistribution of land to the small holder (Deininger and Feder, 2001). By the same token, if the costs of supervising hired laborers were negligible, large landowning households could simply hire labor up to the desired quantity so that the marginal product across households of varying farm sizes would be equalized. However, since hired labor could only be supervised imperfectly, the option of large landowners attaining economies of scale in farm production is unavailable (Binswanger et al., 1995).

Against this background of multiple factor market imperfections in agrarian economies, land rental markets help realign the marginal products across farm households with different land-labor endowments by equalizing operational rather than owned land holdings. In addition, by transferring land use rights from those having a lower valuation of land to those more eager to enhance its productive value, land rental markets serve to facilitate the transfer of surplus rural labor from agriculture to industry. This is a process central to modernization.

In view of the highly segmented credit market and thin agricultural labor market in rural China, an active land rental market should have developed. However, reality contrasts sharply with the above anticipation, as leasing activity reportedly occurs on a mere 3–4% of the arable land (Turner et al., 2001). The incredibly low incidence of land rental transactions could be explained by the type of land tenure and other related institutions in China. First, since land in rural China is owned commonly and access to its use is guaranteed either by birth or acquired through marriage, the scope of land rental activity is inevitably reduced (Turner et al., 2001). In addition, the extent to which China's land tenure arrangements obligate the farm household to deliver a part of its grain output to the state at quantity and prices unilaterally specified by the latter also reduces both the demand and supply of land (Lohmar et al., 2000).² The restrictive effect of grain quotas on land rental activity, and even temporary migration, is arguably strongest in times of relative grain shortages, because village authorities prohibit these activities before households honor their state deliveries (Brandt et al., 2002; Kung and Liu, 1997; Liu et al., 1998; Rozelle et al., 1999). These institutional features combine to have a retarding effect on the development of a land rental market.

There are other, not necessarily mutually exclusive, possibilities as to why a land rental market in rural China has been inactive for a long time. One has to do with risk. Although households with a comparative advantage in off-farm employment may gain by renting out land, this gain may be small compared to the potential risk of possibly being assigned either less land or land of an inferior quality in future

²Demand is suppressed because quotas effectively reduce the returns to land, whereas supply is contracted because the time that households could allocate to off-farm activity and release the land for renting is also reduced.

reallocations if renting out land is interpreted by village authorities as placing a low valuation of land. Predicated on the premise that the demand for rental transactions is essentially a derived demand that is contingent upon the rate at which households with alternative off-farm economic opportunities leave the farms, we attribute the sluggish growth of land rental market in China to the slow, albeit certain, emergence of the labor market. Indeed, while China's off-farm economy began to grow as early as 1981, the acceleration of off-farm employment growth, according to a recent estimate, has been a rather recent phenomenon beginning in 1995 (de Brauw et al., 2002).³ As the labor market develops, the gains from engaging in land rental transactions are likely to rise, as evidenced by the growing incidence of land rental transactions in recent years (Lohmar et al., 2001; Turner et al., 2001).⁴

Drawing upon a carefully enumerated farm survey conducted in six Chinese provinces by the Ministry of Agriculture (MOA) in 1999, we describe the incidence of land rental markets in China and attempt to understand the mechanism leading to its emergence. We use a tobit estimation to test the hypothesis that villages that have more off-farm labor market activities are more likely to experience growing land markets after controlling for differences in institutional arrangements between villages, the most notable of which are land reallocation practices and the size of grain quotas.

The remainder of this paper is organized as follows. To understand the emergence of rental markets, we review the existing literature in Section 2. Specifically, we identify the underlying trends in land rentals both over time and across space. These include the incidence of rental transactions and its determinants. In Section 3, we provide a systematic description of these facts based on the 1999 MOA land rights survey to compare the more recent results with the benchmark findings. In Section 4, we characterize the model underlying the empirical estimation and discuss issues pertaining to endogeneity. The empirical results are interpreted in Section 5, whereas Section 6 concludes with a summary and a brief discussion of policy implications.

2. TRENDS IN LAND RENTALS OVER TIME AND ACROSS SPACE

Information on China's land rental markets is extremely scant. While land rental activity began as early as the 1980's, it remained scarce until recently. According to farm survey results, only 3% of the land had entered the rental market as recent as of 1995, despite the fact that 75% of the villages have reported land rental activity (Brandt et al., 2002), or the freedom to engage in such activity (Liu et al., 1998). Even in areas where the local off-farm economy is highly developed, the

³ The growth rate from 1995 to 2000 was 9% or 1.8% per annum, whereas that between 1981 and 1995 was only 17%, or 1.2% per annum. (de Brauw et al., 2002).

⁴ Two powerful secular trends have led to the recent development of land rental markets. One is the growing representation of young villagers in off-farm employment (de Brauw et al., 2002), whereas the other is the growing income gap between off-farm work and agricultural earnings, discussed below.

reported rental incidence does not exceed 7–8% (Turner et al., 2001). The low incidence of land rental activity in rural China can be explained largely by a number of institutional factors, of which the common property nature of land and grain quotas is most important.

Under common property rights, a villager is entitled to an equal share of this communal resource. Demographic change brought about by natural births and marriages necessitate land reallocation on a periodic basis. For example, a family with a recent addition will be allocated an additional n th share of the village's land from a family that has lost a member, e.g., through a daughter's marriage to another village. In the absence of land rental markets, this institutional arrangement mitigates the mismatch between land and population across farm households resulting from demographic change over time. However, it inevitably reduces the scope of rental activity, to the extent that the two are substitutes (Turner et al., 2001). In addition, common property rights tend to make tenure insecure, because households with surplus land may fear the potential negative repercussions associated with renting out land, such as receiving less land or land of inferior quality in future reallocations (Lohmar et al., 2001).

Like the land tenure system, grain quotas may affect land rental transactions through their effect on the terms of trade. In rural China, land use rights are not unconditional. In addition to an agricultural tax, farm households are required to deliver a predetermined amount of grain to the state at prices unilaterally determined by the latter, called grain quotas, and pay other local taxes and levies. In transferring land use rights, it is customary for the rentor household to transfer these obligations to the rentee household. Where grain quotas are large, they have the effect of lowering the returns to rent land, and accordingly dampening the demand for it (Lohmar et al., 2000). To the extent that these are distributed differentially across villages, but otherwise uniformly apportioned among households within the same village,⁵ rental activity is observed to be more prominent in villages with smaller quotas (Turner et al., 2001).⁶ Similar to their effect on the demand side, grain quotas also suppress the supply of land available for rental because they reduce the labor time available for off-farm work and, thereby, reduce the amount of land that these households could rent out (Lohmar et al., 2000).

The overall low incidence of land rental transactions in rural China notwithstanding, available evidence suggests that such markets, or specifically the freedom with which farm households are allowed to transact land use rights, has varied rather widely across regions (Brandt et al., 2002; Li et al., 1998; Liu et al., 1998). For example, farmers in Zhejiang, Hebei, and Sichuan have the most flexibility

⁵ Lohmar et al. (2000) provide evidence on how grain quotas are distributed differentially among 31 villages in northeastern China. At the one extreme, a few villages have no quotas at all and, at the other extreme, 62% of the land in one village is required to produce the quota.

⁶ Quotas may also affect rental activity in a less direct manner. Where quotas are large and a minimum acreage has to be sown to grain, the freedom to plant crops with higher market prices may be restricted; this is likely to dampen the demand for rented land (Brandt et al., 2002; Liu et al., 1998).

TABLE 1
Incidence and Magnitude of Land Rental Demand by Province

		6 provinces (<i>n</i> = 825) (%)	Zhejiang (<i>n</i> = 132) (%)	Out-migrating provinces ^a (<i>n</i> = 427) (%)
Land rental demand	Yes	24.5	33.3	20.8
	No	75.5	67.6	79.2
Percentage of rented land to total arable land		14.30	35.00	8.90
(1) Mean size of rented land (<i>mu</i> ^b)		2.90	3.68	1.96
(2) Farm size per household ^c (<i>mu</i>)		5.25	6.32	3.77
(3) Ratio of rented land (%): (1)/(2)		55.23	58.22	51.99

Note. Source: Ministry of Agriculture Survey (1999).

^a The out-migrating provinces are Anhui, Hunan, and Sichuan.

^b Given 1 *mu* = 0.0667 hectare.

^c Only households that have rented land from other households are counted.

in this regard. Whereas the former two provinces have an exceptionally thriving off-farm economy, the latter is among the few provinces with the highest rates of out-migration.⁷ In both instances, transfer rights appear to correlate positively with the occupational movement of farmers away from agriculture (Turner et al., 2001). Perhaps as an increasing number of villagers leave for off-farm employment, whether to faraway destinations or locally, the amount of land potentially available for renting out increases correspondingly (Lohmar et al., 2001; Yao, 2000).⁸ Thus, it follows that Zhejiang, a province with an exceedingly thriving off-farm economy, has long enjoyed the greatest freedom with respect to transfer rights and, accordingly, it has had the most active land rental market (Brandt et al., 2002; Liu et al., 1998; and Yao, 2000). The inclusion of this province in the MOA survey allows us to see if this trend has continued.

3. THE EMERGING LABOR MARKET AND GROWING LAND RENTAL TRANSACTIONS: EVIDENCE FROM RECENT SURVEY DATA

More recent evidence shows that land rental activity has accelerated noticeably in recent years, especially in areas where rural labor markets have become relatively active.⁹ According to the results of a farm survey conducted by the MOA in 1999 in 6 Chinese provinces, nearly one-quarter (24.5%) of the 824 farm households had rented land from other households in 1998 (Table 1). Moreover, such an incidence

⁷ The other two are Hunan and Anhui provinces.

⁸ According to Lohmar et al. (2001, p. 14), "... land rental market activity arises as labor leaves the village for work elsewhere." However, Yao (2000) relates an active land rental market to growing specialization among farm households in general, and to the development of an off-farm economy in particular.

⁹ In revisiting their survey sites in 2000, Turner et al. (2001) observe a noticeable increase in land rental transactions since their 1995 survey.

is markedly higher in Zhejiang (33.3%), a province where the incidence of both off-farm employment and out-migration is among the highest nationally (de Brauw et al., 2002). Before analyzing the hypothesized link between growing land rental transactions and an emerging rural labor market, we provide a brief description of the MOA survey, as these are the data that we will use in our analysis.

The 6 provinces covered were chosen to reflect the diversity of China's agricultural heartland. They include Shaanxi in the northwest, Hebei on the North China Plains, Anhui and Zhejiang in the southeast, Hunan in south central, and Sichuan in the southwest. All together a total of 824 farm households, selected randomly from 100 village small groups¹⁰ (VSG) and 36 villages in these provinces, were interviewed.¹¹ The survey consists of two major sections; the first pertains broadly to land tenure characteristics, whereas the second is concerned with the household's participation in labor market activities, including off-farm migration decisions and their consequences (Zhao, 2002). The survey was designed to enumerate a number of variables at both the individual and household levels including a set of land tenure and rental market characteristics that provide a solid basis for analyzing the linkages between land and labor markets. A separate village survey was conducted in the sample villages to gather information on community characteristics.

The descriptive statistics in Table 1 provide an overview of land rental demand based on the MOA survey.¹² With close to one-quarter of the surveyed households reported to have rented land from other households, the rental market is much more active than previously. That such an incidence is highest in Zhejiang (33.3%), the province where off-farm economic participation is also the most active, provides intuition that the two factor markets may be connected. However, rental incidence for Anhui, Sichuan, and Hunan, the three provinces with the highest incidence of out-migration, was somewhat below average (only 20.8%), suggesting that migration activity alone may not be a sufficient stimulus for land rental transactions.

Not only has the number of households engaged in land rental transactions increased, but the amount of land rented has also increased. Against the benchmark finding that only 3% of the arable land had entered the rental market as recent as

¹⁰ A village small group (VSG) coincides with the production team in the commune era or a mutual-aid team in the early 1950's. In South China, where a village is usually smaller, a VSG is typically a natural village settled by families closely related to one another. On the other hand, in north China a natural village is much larger; it frequently coincides with the boundaries of an administrative village, which was a production brigade in the commune era. The villages of Hebei Province are in this category. Excluding this province, the size of VSGs in the 5 sample provinces varies significantly from as few as 14 households to as many as 117 households. The mean size of the sample village group is 47 farm households.

¹¹ From each province, a total of 12 townships, which is the level of village structure that corresponds to the commune in the era of collectivized agriculture, were selected. Then, 3 administrative villages were chosen from each township. Altogether the 36 selected villages formed the basis for selecting randomly the small groups and eventually the farm households for the survey interview.

¹² In the survey, only 51 households were identified as supplying land to the market, whereas 202 households rented land from other households. Much of our analysis is confined to the households on the demand side of the market.

TABLE 2
Per Capita Net Income of Agricultural and Various Off-Farm Activities

Income source	Number of observations	Mean (<i>yuan</i>)	Std. dev.
Local wage	316	5900.74	7283.79
Local self	187	7299.68	9980.21
Migrant wage	175	5589.14	4834.90
Migrant self	64	13539.06	20951.35
Agriculture	808	2381.03	6000.73

Note. Source: MOA Survey (1999).

1995, the corresponding figure of 14.3% must be considered a remarkable increase (row 2, Table 1). Once again, the percentage of land having changed hands in the rental market is highest in Zhejiang (35%). In the last row of Table 1, a crude ratio between the amount of land rented by a household, conditional on it having rented land (row (1) in Table 1) and its mean farm size (row (2) in Table 1) is reported. After adjusting for differences in farm sizes, the average amount of land rented by a household on the demand side of the market exceeds half of its contracted or assigned land, a magnitude that is clearly not trivial. We now examine the evidence on the emergence of labor markets, before stating formally the hypothesis that the development of off-farm labor markets is a powerful stimulus to the development of land rental markets.

There are two discernable trends concerning the development of labor markets in recent years. First, an increasing proportion of the village labor force is working off the farm, either in local employment or migrant work, consisting of self-employment or wage employment (de Brauw et al., 2002; Parish et al., 1995; Rozelle et al., 1999). The MOA survey finds that close to 50% (47.8) of the 1550 working-age individuals with an income have off-farm work of some form (Table 2). As more people leave the farms, the scope of land renting activity increases. Second, the widening income gap between various forms of off-farm work and agriculture affects this process. As the data in Table 2 clearly show, wage employment pays more than twice, and self-employment three to five times as much as agricultural work. This gap must have been a powerful stimulus for farm households to send their members to seek employment and income opportunities in the nonagricultural sector, and thereby create more opportunities for land rental activity.

As the labor market develops, the benefits accruing to land rental transactions rise. For the household supplying land for rent, this market facilitates its participation in the off-farm sector while allowing it to retain its contractual right to the land by meeting the grain quotas. The household on the demand side can utilize its family labor better by expanding farm operations, and also obtain favorable terms from households eager to dispense with their quota obligations, regardless of the size of these quotas. Evidence from the MOA survey reveals that, in nearly

TABLE 3

Household's Land Endowment and Participation in Land Rental and Off-Farm Labor Markets

Province	Number of observations	Arable land per capita (<i>mu</i>)	Share of nonfarm income (%)	Households with land rental activity (demand) (% , <i>n</i> = 202)
Hebei	139	1.61	51.62	2.16
Shaanxi	126	1.33	55.00	50.79 ^a
Anhui	145	1.52	40.71	12.41
Hunan	144	0.95	48.74	26.39
Sichuan	138	1.01	55.25	25.36
Zhejiang	132	0.76	75.07	33.33
Total/average	824	1.20	54.05	24.51

Note. Source: MOA Survey (1999).

^a In Shaanxi Province, 82.8% of the households (53/64) rent land from the village authorities.

two-thirds (64%) of the rental transactions, the supplying household waives the rental payment.¹³ Moreover, the incidence is highest at 77.8% in Zhejiang, which underscores the possibility that the cost of ensuring one's contractual right to the land correlates positively with the opportunity cost of labor.¹⁴

The fact that both land rental transactions and labor markets have been rising in recent years suggests that the two factor markets are intimately connected. The overriding question is causality. Is the land rental market a product of the labor market or does it cause the latter's emergence? Our hypothesis is, given that off-farm earnings are substantially higher than agricultural incomes, income-maximizing farm households try to obtain off-farm jobs first and, when they succeed in doing so, they rent out their land. The descriptive data in Table 3 provide some motivation for this hypothesis. Land endowment is inversely correlated with off-farm activity, measured by the share of a household's income from such sources, and with land rental activity. The more land abundant is a province, e.g., Hebei and Anhui, the lower is its share of off-farm income at 51.62% and 40.71%, respectively. Similarly, the incidence of land rental activity is also lower at 2.16% and 12.41%, respectively. Conversely, farm households in land-scarce Zhejiang obtain a large portion of their income (75%) from off-farm sources and they also enjoy the highest income (see Appendix, Table 7). The substantial engagement of Zhejiang households in off-farm work explains its exceptionally active land rental markets (33.33%) in the province.¹⁵ We test formally this hypothesis in the following section.

¹³This group of renting households has a substantially higher mean grain quota (153.77 catties per *mu* of land) compared to only 73.88 catties among those households that pay rents.

¹⁴According to de Brauw et al. (2002), Zhejiang has had both higher off-farm participation rates historically and these have grown faster than those other provinces. Off-farm participation rates of rural residents across Zhejiang reached nearly 65% in 2000.

¹⁵Up to 83% of the land transactions in Shaanxi involve the village authorities as the renter. If we count only transactions between farm households, the magnitude is 14% (9 out of 64 cases).

4. HYPOTHESIS AND EMPIRICAL ESTIMATION

Due to the under-enumeration of supply-side activity in the MOA survey, we test to see if households with active participation in off-farm labor markets, measured by the number of days worked, may rent in less land, conditional upon having rented land. In view of the obvious left censoring problem of our data, we use a tobit model as the estimator. However, our estimation will be biased if decisions regarding land rental and labor allocation were determined jointly. In order to test robustly the hypothesis that decisions regarding participation in off-farm work are truly exogenous to the land rental decisions, we instrument the former variable. An instrumental variable must correlate with the independent variable being instrumented, i.e., off-farm employment, but should otherwise have no independent effect on the residual of the dependent variable, i.e., the amount of land rented, except through its effect on off-farm activity (Angrist et al., 1996). According to this criterion, our identification strategy is to use off-farm economic activities in a village group to correlate with similar activities in other, especially neighboring, groups within the same village.¹⁶

Regarding migration, studies have found that the migrants' own social networks, typically confined to neighboring if not the same villages, have played a significant role in facilitating the migration process (S. Zhao, 2000; Y. Zhao, 2001). Similarly, where a township or village administration manages a collection of public firms, called township and village enterprises, its inhabitants are the likely beneficiaries of such employment opportunities (Kung, 1999). By contrast, given that rental transactions seldom occur beyond the boundaries of a village small group, the degree of off-farm economic development in village groups other than the one being instrumented should have no direct effect on land rental activity in that particular group. For these reasons, our choice of the instrumental variable is an appropriate one.

Specifically, we instrument local off-farm work by the average number of days that villagers in all but one ($n - 1$) of the village small groups in a given province have worked in similar employment.¹⁷ Thus, the instrumental variable becomes $IVDYLOF = (dylof_1 + dylof_2 + \dots + dylof_{n-1}) / (n - 1)$, where $IVDYLOF$ stands for the instrumental variable, and $1, 2, \dots, n$ stand for the different village groups.¹⁸ By the same reasoning, migrant off-farm work is instrumented by the average number of days that villagers in all but one of the groups ($n - 1$) in migrant off-farm employment in a given province have spent working; that is, $IVDYMOF = (dymof_1 + dymof_2 + \dots + dymof_{n-1}) / (n - 1)$.

¹⁶ I thank Scott Rozelle for stimulating discussions on the choice of instrumental variables.

¹⁷ In order to smooth out intergroup variations due to differences in village size, we normalize the average number of days worked by the number of households in a village.

¹⁸ Village small groups do not exist in Hebei Province because the village represents the lowest organizing unit; therefore, we increase the unit of analysis for Hebei by using $n - 1$ villages in that province for its sample of 130 households and 6 villages when constructing the instrumental variables.

In testing the induced land rental market hypothesis, we must control for the possible effects of land tenure arrangements and grain quotas on rental market behavior. Land tenure arrangements could affect rental market behavior via two possible channels. First, more reallocations in the recent past might reduce the magnitude of rental market transactions, which is a substitution hypothesis (Turner et al., 2001). Second, a more secure regime may affect the magnitude of rental activity. To account for the effect of past reallocation practices, we use the percentage of land reallocated in the last 5 years as a proxy and anticipate a negative relationship between the two. With respect to tenure security, we use a survey question that asks farmers about their expectations regarding whether land will be reallocated within the current contract period. We treat this as a dummy variable for which a yes answer indicates a sense of insecurity. We assume that insecurity will impact negatively land rental transactions.

However, the effect of grain quotas on land rental transactions is less straightforward. Although researchers typically see grain quotas as having a predictably negative effect on land rental transactions, this view ignores the possibility that households with a comparative advantage in off-farm work could gain from renting out their land,¹⁹ as long as they are not restricted from doing so. Therefore, we consider the effect of grain quotas to be ambiguous.

After controlling for these two alternative explanations of land rental behavior, the structure of our tobit estimation is

$$QLd_d = \alpha + \beta\mathbf{F}' + \gamma\mathbf{L} + \lambda\mathbf{Q} + \mu\mathbf{V} + \eta\mathbf{HI} + \varepsilon. \quad (1)$$

The dependent variable, QLd_d , is the quantity of land demanded or rented by a household, conditional upon it participating on the demand side of the market, and α is the constant term. \mathbf{F}' denotes a vector of two nonfarm economic variables in terms of the number of days worked by the local (LOCAL) and by the migrant workers (MIGRANT), including the self-employed, respectively. Distinguishing nonfarm economic activity in these two dimensions allows us to test for their differential effects on rental magnitude. The variable \mathbf{L} is a vector of the two variables pertaining to the land tenure institutions, namely, the size effect of past reallocations (SIZE) and expectations concerning tenure security (EXPECT), the latter a dummy variable. The variable \mathbf{Q} stands simply for grain quotas. The variables \mathbf{V} and \mathbf{HI} are control variables at the village and household-cum-individual levels, respectively. These variables may affect the amount of land a household rents. The coefficients β , γ , λ , μ , and η are the parameters to be estimated, and ε is the error term.

The two village variables included for the purpose of control are the percentage of the labor force in a village with off-farm work and the per capita arable land

¹⁹Hiring farm laborers does not appear to be a feasible alternative, given the overall poor returns to farming. This may explain why such a market is thin in China (Kung and Lee, 2001).

between different village small groups. The first variable controls for the variations in the degree of off-farm development. For example, a village in which 80% of its labor force is already engaging in off-farm economic activity is likely to have a more active land rental market than one with only 20%. For this reason, we control for differences in off-farm labor participation between villages (VLNF). Using the same reasoning, land rental activity may also be affected by the amount of land a village has available. This would be especially true if the constraint comes from the supply side. Since land available for renting is not observable, we can use only per capita arable land between village small groups (LANDGP) as a proxy to control for differences in the amount of land available for renting between the different village groups.²⁰

Finally, **HI** represents a vector consisting primarily of household and individual characteristics. At the household level, these are the amount of cultivable land available for each person in the household for farming (PCLD) and the ratio of nonworkers to workers in a household (dependency ratio, or DPRAT). Individual characteristics include the average educational attainments of family members in a household (EDUAVG) and the age (AGEHD) and square of age of the household head (AGE²HD). Intuitively, the amount of land rented is expected to vary directly with age and the dependency ratio, on the one hand, and inversely with per capita arable land and educational level, on the other. Summary statistics for the explanatory variables are provided in the Appendix (Table 8).

5. EMPIRICAL RESULTS

Two specifications for the tobit estimations of the demand for rental land are presented in Table 4. In Model 1, the farmers' expectations regarding future land reallocations (EXPECT) are used as proxy for tenure insecurity. In Model 2, the effect of land tenure is measured in terms of the percentage of land that has been reallocated in the last 5 years (SIZE).²¹ On balance, the tobit results confirm our expectations regarding the effects on land rental markets of off-farm labor markets, grain quotas, and to a lesser extent land reallocation practices. First, our main hypothesis that the development of the off-farm labor market correlates negatively with the magnitude of rental activity is confirmed. The two off-farm employment variables, LOCAL and MIGRANT, are negative and highly significant at the 1% level in both estimations. Since the dependent variable is a measure of the demand for land rental, households that participate more actively in off-farm activities should rent less land. Furthermore, the coefficients for grain quotas are positive

²⁰ Village small groups are chosen because the majority of land rental activity, 75% for the entire sample and 85% in Zhejiang, occurs within the group.

²¹ We have also estimated two additional specifications in which per capita arable land (pclid) is replaced by a similar variable that controls for differences in land endowment between the village groups (landgp). Since the results of these estimations are basically similar to those of the original specifications, we do not report them here.

TABLE 4
Tobit Regression Results on Amount of Land Rented (Demand)

Dependent variable	Model 1 (Land)	Model 2 (Land)
Household		
Agehd	0.679** (2.210)	0.713** (2.310)
Age ² hd	-0.008** (-2.330)	-0.008*** (-2.440)
Eduavg	-0.253 (-1.480)	-0.264 (-1.530)
Dprat	1.479 (0.780)	1.743 (0.920)
Pcld	0.083 (0.510)	0.065 (0.400)
Nonfarm activities		
Local	-0.023*** (-4.120)	-0.024*** (-4.300)
Migrant	-0.028*** (-3.660)	-0.028*** (-3.650)
Institutions		
Expect	0.595 (0.710)	— —
Size	—	0.022* (1.890)
Quota	0.010*** (2.840)	0.011*** (2.880)
Village		
Vlnf	-0.925 (-0.470)	-0.688 (-0.350)
Provincial dummies		
Shaanxi	10.251*** (5.810)	12.872*** (5.350)
Sichuan	5.695*** (3.270)	8.769*** (3.490)
Anhui	1.782 (0.960)	4.680* (1.870)
Hunan	7.339*** (4.230)	10.314*** (4.150)
Zhejiang	9.309*** (5.110)	11.797*** (5.080)
_constant	-23.721*** (-3.120)	-27.461*** (-3.480)
Number of observations	765	765
R ²	0.090	0.092

Note. The absolute values of the *t*-statistics are in parentheses.

* Indicates statistical significance at the 10% level.

** Indicates statistical significance at the 5% level.

*** Indicates statistical significance at the 1% level.

and significant at the 1% level in both estimations. The positive sign suggests either that farm households with large quotas are renting out land to get rid of the quota burden and its resulting implicit labor constraint or farmers with large quotas of their own are renting land from those with comparatively lighter burdens to lower their average quota responsibilities.²²

The evidence indicates that households renting land have distinctively larger mean quotas (128.6 catties of grain per *mu* of land) than households supplying land for rent (62.8 catties) or those with no rental activity (72.4 catties).²³ Second, of the 202 households that have rented land, 64% are exempt from rental payments. These households have distinctively larger grain quotas (153.8 catties per *mu*) than those renters that are required to pay rents (73.9 catties only).²⁴ Third, while land rental transactions seldomly occur beyond the boundaries of the village small group (74% on the whole and 85% in Zhejiang), grain quotas, which are apportioned on the basis of farm size, are not uniformly distributed within the group.²⁵ This evidence suggests that households with differing human capital and quota obligations have been trading with one another to realize the gains from trade arising from differences in these two margins.

The effect of land reallocation practices on land rental activity is mixed. Whereas the perceptions of tenure security (EXPECT) have no significant effect on the amount of rented land, the size of past reallocations (SIZE) does, albeit in only a marginally significant way. However, contrary to the substitution hypothesis, the sign of this variable is positive, suggesting that the size of past reallocations is more likely to be complementary to land rentals.²⁶ One possible explanation is that the local off-farm economy is developing so rapidly that the mere reallocation of land via administrative means is insufficient to cope with the structural transformation of the economy.²⁷ Whether this conjecture approximates reality is beyond the scope of this paper and requires further research.

With the exception of per capita arable land or PCLD, the signs of all the other remaining variables have the expected signs. For example, the positive coefficient

²² I thank Louis Putterman for pointing out this possibility.

²³ Using households with no land rental activity as the reference group, the *t*-test confirms that there is no significant statistical difference between this group and the rentor group, whereas the difference is significant between those who rent land and those who do not.

²⁴ The difference in *t*-value between the two is also strongly significant.

²⁵ While some of these variations are small, with a standard deviation of only 3.97 kilograms per *mu*, others are large at 254 kilograms per *mu*. There are 6 villages in the sample with no grain quotas.

²⁶ To test to see if our results may have been biased by Zhejiang Province, which has experienced both the largest land reallocations and has the most active land rental market, we exclude this province in another regression that is not reported. While the result is no longer significant statistically, the sign remains unchanged.

²⁷ To the extent that decentralized land rental transactions are largely a function of the rate of off-farm labor absorption, the incidence should be independent of the magnitude of past reallocations. This would be especially true if administrative land reallocations were made largely in response to changes in family demographics.

of the age variable (AGEHD) confirms our hypothesis that the demand for rental land is likely to be higher among households with older heads. This is consistent with the results of de Brauw et al. (2002) showing that the younger generation, especially those below age 30, has become increasingly disengaged from on-farm work. The anticipated negative coefficient of the lifecycle effect AGE^2HD suggests that, as the head of the household gets older, the incremental demand for rental land decreases. Similarly, the signs of education (EDUAVG) and dependency ratio (DPRAT) are consistent with our expectations. The negative coefficient of EDUAVG means that the households with more educated members rent less land, because of higher returns to off-farm work. The positive coefficient of DPRAT implies that households with more dependents are likely to have a greater demand for rental land. However, both variables are not significant statistically. Finally, contrary to our expectations, the sign of PCLD is positive; however, it is not statistically significant.

To ascertain if the two nonfarm participation variables are indeed exogenous to the dependent variable in question, we instrument them with IVDYLOF and IVDYMOF.²⁸ The first-stage regression results are presented in Table 5. Interestingly, while the instrument for local off-farm employment is significant (columns 1 and 3), the one for migrant work (columns 2 and 4) is not. What accounts for this discrepancy? If the village authorities provide the bulk of the local off-farm employment opportunities, they are likely to be distributed in a uniform manner among farm households across different village groups. However, the same effect does not necessarily apply to migrant off-farm activity. While social networks play an important role in the migration process, little is known about the geographical boundaries of this effect. For example, is this network effect confined largely to only the same natural village or hamlet in the larger administrative village or is it disseminated among them? In the absence of further information, the seemingly weaker correlation of off-farm migrant activity between the different hamlets suggests that the effect of local off-farm and migrant economic activity is unlikely the same for the villagers.

Table 6 reports the results of the second-stage regressions, in which the predicted values of LOCAL and MIGRANT, $dy\hat{l}of$ and $dy\hat{m}of$, remain significant. The reduction in the level of significance of these predicted values from 1% to 10% is attributable to the endogeneity problem. That these variables remain significant at the 10% level after correcting for this problem confirms the robustness of our hypothesis regarding the causal relationship between off-farm labor markets and land rental markets.

²⁸ There are two stages in this exercise. In the first stage, the variable LOCAL AND MIGRANT (X) is assumed to be specified as $X = \alpha_0 + \beta_1 Z + \text{control variables}$, where Z is the instrument and X is the variable that is suspected to be endogenous with the dependent variable. After the first stage regression, the predicted value of X , X^* ($dy\hat{l}of$ and $dy\hat{m}of$ in Table 6) is obtained, which is used in the second stage of the regression, taking the form $Y = \delta_0 + \lambda X^* + \text{control variables}$.

TABLE 5

Ordinary Least Squares Results on Quantity of Land Rented (Demand): First-Stage IV Estimates with Local and Migrant Off-Farm Activity Treated as Endogenous

Dependent variable	Model 1		Model 2	
	(1) Local	(2) Migrant	(1) Local	(2) Migrant
Instrumental variable				
IVDYLOF	0.414 (3.93)***		0.492 (4.72)***	
IYDYMOF		-0.054 (0.36)		-0.054 (0.36)
Household				
Agehd	-4.834 (2.13)**	-1.984 (1.23)	-4.774 (2.15)**	-1.984 (1.23)
Age ² hd	0.050 (2.12)**	0.029 (1.75)*	0.051 (2.18)**	0.029 (1.75)*
Eduavg	4.319 (3.01)***	1.680 (1.65)	4.491 (3.19)***	1.680 (1.65)
Dprat	7.458 (0.46)	-15.242 (1.33)	6.415 (0.41)	-15.242 (1.33)
Pcld	-8.014 (4.19)***	-2.247 (1.65)*	-8.074 (4.32)***	-2.247 (1.65)*
Institutions				
Expect	19.819 (2.75)***	0.038 (0.64)		
Size			-0.486 (5.97)***	0.038 (0.64)
Quota	-0.074 (2.00)**	0.045 (1.67)*	-0.060 (1.65)*	0.045 (1.67)*
Village				
Vlnf	-34.775 (2.03)**	18.985 (1.60)	-30.258 (1.79)*	18.985 (1.60)
Provincial dummies included				
	Yes	Yes	Yes	Yes
_constant	157.741 (2.78)***	39.255 (0.96)	206.948 (3.67)***	39.255 (0.96)
Number of observations	765	765	765	765
R ²	0.17	0.11	0.20	0.11

Note. The absolute values of the *t*-statistics are in parentheses.

* Indicates statistical significance at the 10% level.

** Indicates statistical significance at the 5% level.

*** Indicates statistical significance at the 1% level.

Further comparisons of the two sets of results in Tables 4 and 6 show that the effect of grain quotas, which is significant in the original tobit estimation, is no longer significant. In the second-stage regressions using instrumental variables, education (EDUAVG), dependency ratio (DPRAT), and village differences in their levels of off-farm labor participation (VLNF) have become significant,

TABLE 6

Ordinary Least Squares Results on Quantity of Land Rented (Demand): Second-Stage IV Estimates Using the Predicted Values of LOCAL and MIGRANT(*dylof* and *dymof*)

Dependent variable		Model 1 (Land)	Model 2 (Land)
Household			
<i>dylof</i>	17.45 ^a	-0.048 (1.69)*	0.144 (0.32)
<i>dymof</i>	10.12 ^a	0.414 (1.92)*	-0.037 (1.47)
Agehd		1.437 (2.81)***	0.973 (1.09)
Age ² hd		-0.019 (2.78)***	-0.012 (0.93)
Eduavg		-0.824 (2.15)**	-0.410 (0.56)
Dprat		9.092 (2.46)**	4.947 (0.71)
Pcld		0.756 (1.61)	0.246 (0.27)
Institutions			
Expect		1.414 (1.46)	
Size			-0.003 (0.11)
Quota		-0.011 (1.05)	0.002 (0.09)
Village			
Vlnf		-10.438 (2.34)**	-5.095 (0.61)
Provincial dummies			
Shaanxi		13.213 (4.80)***	10.522 (3.44)***
Sichuan		7.046 (3.16)***	5.543 (1.89)*
Anhui		2.402 (1.01)	1.250 (0.39)
Hunan		-9.133 (1.16)	0.178 (0.01)
Zhejiang		8.428 (4.38)***	9.105 (2.25)**
_constant		-37.887 (3.17)***	-28.493 (1.67)*
Number of observations		797	797
Pseudo R-squared		0.078	0.078

^a Indicates the Hausman–Wu exclusion restriction test statistic (χ^2).

Note. The absolute values of the *t*-statistics are in parentheses.

* Indicates statistical significance at the 10% level.

** Indicates statistical significance at the 5% level.

*** Indicates statistical significance at the 1% level.

whereas previously they were not. The signs of their coefficients are consistent with our hypothesized expectations in that households with more education and villages with greater proportions of off-farm labor participation are less likely to rent land, whereas families with larger dependency ratios rent more land. Finally, the age of the household head remains consistently significant in all the estimations both before and after the use of instruments. Its positive coefficient suggests that the chances for an older household head to rent more land are larger because of the path-dependent nature of his prior farming experience and that the costs to older cohorts of getting involved in off-farm, particularly migrant work, are higher. As the household head ages, the incremental demand for land rental decreases. This is reflected in the negative coefficient of AGE^2HD , a variable that captures the lifecycle effect of the household head.

Summing up, our hypothesis that households with active participation in off-farm labor markets rent less land is confirmed by our empirical analysis, both with and without the use of instrumental variables. In the latter analysis, the reduction in the degree of statistical significance of the predicted values of the two off-farm employment variables is attributable to the endogeneity problem. However, the fact that these variables remain significant after correcting for this problem strengthens our hypothesis that the direction of causality is from the development of off-farm labor markets to the growth of land rental activities. As is usually the case, the significance of the control variables changes in the regressions with instrumental variables. Before using instrumental variables, quota was significant but education and the dependency ratio were not. In the regressions using instrumental variables, quota loses its significance, whereas education and the dependency ratio, along with the degree of off-farm labor participation at the village level, become significant. Nonetheless, the signs of these variables are consistent with the hypothesized expectations and have remained stable throughout the regressions. Last, given that it is the only significant variable in the regressions with and without instrumental variables, the age of the household head may be regarded as a good predictor of the demand for rental land in addition to the off-farm labor market effect.

6. CONCLUSION

Until recently, land rental markets had been inactive in rural China. The limited available information suggests that few households had exchanged land use rights and, accordingly, only a negligible percentage of land had changed hands. Observers have attributed this low incidence of land rental activity to the current land tenure system and other institutional constraints. However, recent survey evidence has begun to show that land rental activity has accelerated. The key analytical question is: Why have land rental transactions become more active after

being dormant for almost 15 years since the rural reforms, in the absence of fundamental changes in property rights and other institutional parameters?

Drawing upon a nearly national representative farm survey, this paper seeks to explain the recent development of land rental markets in China as a response to the development of another factor market, the off-farm labor market. That the direction of causality runs from the labor to the land market and not the other way is attributed to the large earnings gap between off-farm activity and farm incomes. To the extent that off-farm work pays several times more than agricultural work, it is reasonable that a villager tends to take it first when presented with such an opportunity, before deciding what to do with his contracted land. By testing the causal relationship between the two off-farm labor participation variables and land rental magnitude with appropriate instruments, we show robustly that local off-farm employment is exogenous to land rental decisions. Although intended primarily for the purpose of control, the expected negative effects of China's land tenure system and grain quotas on land rental behavior are not supported empirically.

Our key finding that the explosive growth of off-farm labor market activities is the main catalyst of rising land rental activity has important public policy implications. In the popular view, rural labor mobility is affected negatively by China's current land tenure system and other related institutional arrangements. If rural labor mobility is key to economic development, the overriding aim of public policy should be to remove the institutional impediments, the most important of which is the communal nature of land rights. However, to the extent that the development of off-farm labor markets is driven by forces exogenous to land rental transactions and, moreover, that its development serves to fuel the growth of land rental markets, policy measures to facilitate this transforming process should assume top priority.

APPENDIX

TABLE 7
Resource and Economic Characteristics of the MOA Surveyed Households

Province	Arable land per capita (<i>mu</i>)	Net income per capita (<i>yuan</i>)	Grain quota per <i>mu</i> (<i>jin</i>)
Hebei	1.61	2636.41	3.51
Shaanxi	1.33	1293.08	74.84
Anhui	1.52	891.25	158.59
Hunan	0.95	1462.32	67.97
Sichuan	1.01	1829.00	96.91
Zhejiang	0.76	4189.65	94.21
Total/average	1.20	2032.32	82.55

Note. Source: Ministry of Agriculture Survey (1999).

TABLE 8
Summary Statistics for Explanatory Variables

Variable	Observations	Mean	Std. dev.
Land (demand)	824	0.70	2.67
Household			
Agehd	824	47.09	10.91
Age ² hd	824	2336.47	1059.52
Eduavg	824	5.66	2.22
Dprat	824	0.36	0.24
Pcld	824	1.20	1.56
Nonfarm activities			
Local	793	62.74	87.07
Migrant	793	29.60	58.72
Institutions			
Expect	824	0.25	0.43
Size	665	0.71	0.45
Quota	763	80.13	91.04
Village			
Landgp	805	1.28	1.30
Vlnf	824	0.28	0.22
Provincial dummies			
Shaanxi	824	0.15	0.36
Sichuan	824	0.17	0.37
Anhui	824	0.18	0.38
Hunan	824	0.17	0.38
Zhejiang	824	0.16	0.37

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