



Land documents, tenure security and land rental development: Panel evidence from China



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ARTICLE INFO

Article history:

Received 22 December 2014

Received in revised form 14 September 2015

Accepted 14 September 2015

Available online 26 September 2015

JEL classification:

O12

Q15

Keywords:

Land use rights

Land document

Land transfer

Correlated random effect model method

China

ABSTRACT

We use household and farm-plot level data from a two period panel survey covering six provinces in China to explore how tenure security, especially issuance of land documents, affected people's behavior in China's rural land rental market. A correlated random effect model is used to account for the endogeneity of document issuance and land reallocations. The econometric analysis shows that possession of documents and fewer major land reallocations encourage households to engage in land renting to non-family members, and the effects of land right documents are stronger in 2008 than in 2000.

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1. Introduction

The current literature in development economics postulates that institutions have a central role in facilitating economic growth (North, 1990). Secure property rights are viewed as an important element of an institutional environment conducive to growth (de Soto, 2000). For rural households, their key asset is land. Understanding land rights formation and measuring its effects on productivity are two central issues of the political economy of development (Eggertsson, 1990; Besley, 1995).

Despite China's impressive record on economic development and urbanization over the past three decades, agriculture remains an important source of income and employment for a large segment of its rural population. The most recent agricultural census data indicate that as of 2006, 32% of rural household residents worked full time in farming, and more than 96.6% of rural household residents were engaged in farming activities for at least 1 month a year (NBSC, 2007). Improving tenure security and land access is not only critical to the hundreds of millions whose livelihoods are directly dependent on agricultural production, it is also crucial for China's overall economic development and rural transformation.

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Economic theory holds that tenure security is expected to improve economic development (Besley, 1995). Documentation of rural land use rights is an important way to impart greater security to land rights. Through land documentation, governments confirm the land rights of individuals, households, or communities. The process can identify the holders of land use rights and the content of the rights at issue, as well as specify relevant information regarding the affected land parcels.

In China, rural households possess 30-year use rights to the land they farm according to the 2003 Rural Land Contracting Law (RLCL) and other central policy directives. To document these rights, farm households should be issued land use rights contracts and land use rights certificates (Prosterman, Li, & Zhu, 2006). Land use rights certificates are designed by provincial governments and affirmed by the seals of county governments. Such certificates are required to be issued to farmers under the terms of China's Land Management Law, as revised in 1998. Under the terms of the 2003 RLCL, land use rights contracts are to be issued to rural households, in addition to land certificates. A land use rights contract is designed by a local people's government at or above the village level. The contract is completed at the village level: a representative of the village collective enters the relevant information onto the contract document and that official and the farm household sign the contract.

Land use right contracts symbolize greater security of tenure than land use rights certificates because the contracts contain the signatures or seals of both parties whereas the certificates generally do not. Current Chinese law requires the issuance of both land use rights certificates and land use rights contracts. Possession of both documents thus reflects greater compliance with the law. In turn, households receiving both documents should have greater security of land tenure than households receiving only one of the two documents. Among the latter households, those receiving land use rights contracts should have a greater sense of tenure security than those receiving only land use rights certificates. We expect that these differing degrees of tenure security should be associated with differing patterns of behavior on the part of rural Chinese households.

According to the literature more secure and better-enforced tenure security can improve economic development through three main channels: 1) increase owners' incentives to make land-related investments; 2) increase incentives to transfer land to more efficient uses through markets; and 3) facilitate the use of land as collateral for credit (Besley, 1995; Deininger, 2003; Feder & Feeny, 1991). Under current circumstances, there are few instances where secure land rights provide access to a formal credit market in China. Thus only the first and second channels for economic development would seem to be relevant to China.

The importance of a possible investment incentive effect that comes about through secure land tenure has long been studied both at the theoretical level (Haavelmo, 1960; Jorgenson, 1967) and at the empirical level (see Besley (1995), and Deininger and Jin (2006) in the context of Africa; Alston, Libecap, and Schneider (1995); Lopez (1997), and Lanjouw and Levy (2002) in the context of Latin America; and Feder (1988); Jacoby, Li, and Rozelle (2002), and Do and Iyer (2003) in the context of Asia). On the other hand, much less attention has been devoted to studying the impact of tenure security on the functioning of land markets (Deininger & Jin, 2005; Holden, Deininger, & Ghebru, 2009). Yet, improved functioning of land markets can have a profound influence on productivity growth. First, land transfers between producers through land markets will help to allocate land to labor more efficiently (Deininger & Jin, 2005). Second, with a well-functioning land market, owners working off-farm can continue enjoying the benefits of land ownership (Otsuka & Hayami, 1988). In turn, more laborers are freed to perform off-farm work. A well-functioning land rental market in China will promote development of the rural economy and emergence of greater opportunities for off-farm employment. It will also be critically important in facilitating industrialization and the structural transformation of China's rural economy (Jin & Deininger, 2009; Kimura, Otsuka, Sonobe, & Rozelle, 2011).

Our research on land tenure security gives special attention to its effects on the quality of rural land markets. Existing research investigating the effects of tenure security on land markets has typically focused on the effect of tenure security on raising participation in land rental or sales markets (Deininger, Ali, & Alemu, 2011; Deininger & Jin, 2005), while ignoring the quality of those markets. One exception is the study by Macours, de Janvry, and Sadoulet (2010). Based on survey data from the Dominican Republic, they show that insecure property rights cause segmentation in the tenancy market along socioeconomic lines, severely restricting the choice of lessors for lessees with considerable efficiency loss. Beyond the low participation rate in the market, the informal features of the market (such as transactions predominantly between relatives) in those transition economies with less tenure security warrant more research attention. While land markets include sales markets and rental markets in much of the world, only the land rental market is relevant in China because land sales by individual farmers are not allowed.

Our study also introduces a more refined measurement of land tenure security. Previous research investigating the effects of land tenure in China has used administrative readjustments of land use rights or the issuance of land use rights documents as their indicator of land tenure security. With more information, we will examine these two factors separately. We also compare having two land use rights documents versus only one document. Finally, we compare the effect of having a land use rights contract versus a land use rights certificate.

The objective of this article is to assess the impact of tenure security, especially the issuance of land documents, on the choices lessors make in selecting their lessees in the rural land renting market in China. Specifically, the following three hypotheses are being tested:

First, the issuance of land use rights documents encourages land transfers between parties who are not relatives, while the occurrence of administrative land readjustments discourages such transfers.

Second, having both land use rights documents encourages transfers between non-relatives, and the land use rights contracts are more helpful in this respect than the certificates.

Third, with the implementation of the RLCL beginning in 2003, the effect of tenure security on land transfers between non-relatives is stronger in 2008 than in 2000.

To meet our objectives, the rest of the paper is structured as follows: Section 2 provides background on China's land policy as well as the history and current situation of its land rental market. Section 3 describes the data and the econometric approach used in this paper. Section 4 provides some summary statistics based on our data to describe the weak tenure security and immature rural land

rental markets in contemporary China. Section 5 discusses the econometric evidence on the effects of tenure security on household behavior in land renting. Section 6 concludes with policy implications and suggestions for future study.

2. China's land tenure security and land rental market

We begin by briefly introducing the evolution of China's land policy and the development of the rural land rental market.

2.1. China's land policy and tenure security

Land policies have occupied center stage in China's social, economic and political spheres throughout history. Before the communist revolution, most of China's cultivated land was in the hands of landlords and the majority of farmers cultivated small plots under various tenancy arrangements (Hilton, 1997; Huang, 1995). After the founding of the People's Republic of China in 1949, the lands of former landlords were confiscated and subsequently redistributed to poor peasants on an egalitarian basis (Prosterman, Temple, & Hanstad, 1990). In the 1950s, the communist government adopted the Soviet model in which the means of production were transformed from private to collective entities. This led to disastrous consequences for output and rural welfare, including the great famines of 1958–60 which resulted in the deaths of millions of rural residents (Lin & Yang, 2000; Putterman & Skillman, 1993; Yao, 1999). The 1978 Rural Household Responsibility System (HRS) de-collectivized China's agricultural production system by assigning individual households' 15-year land use rights. The land was still owned by the collective, but cultivating households became residual claimants to their farm output. This set off immediate boosts in output and productivity (Lin, 1992; McMillan, Whalley, & Zhu, 1989).

To sustain and further improve its productivity growth, the Chinese government gradually implemented a series of land regulations and policies to further strengthen rural land tenure security (Zhu et al., 2006). Land use rights were extended to an additional 30 years upon expiry of the original 15-year leases in the late 1990s through the second-round of land use rights contracting. The 1998 Land Management Law (LML) required that farmers receive written documentation of their 30-year land use rights (Chen & Davis, 1998; Jin & Deininger, 2009; Zhu et al., 2006).

Evidence from early studies, however, indicates that a substantial number of households either did not receive any land documentation (Deininger & Jin, 2009) or received some sort of land documentation in which the content is not fully consistent with the LML (Zhu et al., 2006). Furthermore, the administrative reallocations of land use rights continued to pose a threat to tenure security in rural China (Rozelle, Brandt, Guo, & Huang, 2002). Rural family members who worked off-farm were afraid of renting out their land. Doing so could be perceived as a signal that the land was no longer needed and could be administratively reallocated to another household (Brandt, Rozelle, & Turner, 2004; Yang, 1997).

Higher tenure security therefore was seen as critical for more active rental markets and a vibrant off-farm economy in China (Jin & Deininger, 2009). The passage of the 2003 Rural Land Contracting Law (RLCL) was specifically intended to achieve this goal (Jin & Deininger, 2009). The new law includes a number of measures intended to significantly enhance tenure security and transferability of land. For example, in Ch. 2, § 2, article 19 of the RLCL, in order to confirm the contracting relationship, collectives and farmers are required to execute written contracts and certificates. Furthermore in Ch. 2, § 5, articles 32–43, for the first time, the law specifies the right of farmers to carry out various transactions regarding the contracted land (e.g., the right to rent, assign and exchange) (Zhu et al., 2006).

2.2. Land rental market in China

In China, rural households were given land transfer rights as early as 1984 by state document no. 4, which indicated that households could rent in/out their land with permission from village leaders (Lin, 1989). Subsequent survey evidence showed that for over 70% of the cases such permissions were not actually needed (Brandt et al., 2004). However, for reasons including insecurity of land rights, land transactions were very limited before the 1990s (Deininger & Jin, 2005; Kimura et al., 2011; Kung, 2002; Zhang, Ma, & Xu, 2004).

In the late 1990s, the development of a land rental market increased in China, and the share of rural households who rented in cultivated land increased from 1–2% in 1988 (Brandt et al., 2004) to 9.4% in 2000 (Deininger & Jin, 2005) and to 13.5% in 2001–2004 (Jin & Deininger, 2009). Our data also indicate that land rental markets have emerged rapidly in recent years (Table 4) with the share of households renting in (out) land increasing from 17% (12%) in 2000 to 27% (19%) in 2008.

There are several benefits from the growth of the land rental market. First, it provides efficient allocation of cultivated land. Deininger and Jin (2005) have shown that, compared with administrative land reallocations, land rental markets are a more efficient way to transfer land from low-productivity farming households to high-productivity ones. Along similar lines, Zhang, Wang, Glauben, and Brummer (2011) argue that the development of the land rental market can serve as a substitute for administrative land reallocation in optimizing the distribution of land resources. Second, with transfers in the renting market to more efficient producers, rural labor is freed up to participate in off-farm employment, which can improve both efficiency and equity in contemporary China. Third, land rental markets facilitate the consolidation of highly fragmented operational land holdings which can reduce production costs (Hayami & Ruttan, 1985). Expanding the operational land size of an average cultivator is one means by which to prevent further widening of the income disparity between those who remain in the agricultural sector and those who have moved into the off-farm sector (Kimura et al., 2011). To achieve these benefits, policies in China in recent years have consistently encouraged the emergence of a rental market for cultivated land. Policy documents state that farmers should strive to rent in land in order to increase their farm size,

Table 1
Correlation among features of contract.

	Contractual type		Contractual period		Rent	
	Oral (%)	Written (%)	Term not fixed (%)	Term fixed (%)	Rent free (%)	Rent charged (%)
Rent out land						
Kinship contract	91.72	8.28	93.2	6.8	73.37	26.63
Non-kin contract	91.24	8.76	81.7	18.3	52.58	47.42
	n.s.	n.s.	>***	<***	>***	<***
Number of observations	664	62	632	94	452	274
Rent in land						
Kinship contract	98.5	1.5	95.3	4.7	71.2	28.8
Non-kin contract	75.1	24.9	66.5	33.5	45.6	54.4
	>***	<***	>***	<***	>***	<***
Number of observations	676	118	626	168	449	345

Notes: The data is from a two-round (1st round in 2000, and 2nd round in 2008) nationwide survey in China. The table compares kinship and non-kinship contracts for all rented-out plots and rented-in plots (2000 and 2008 cases are pooled together). ">" means that the kinship contracts have significantly higher value, while "<" means that the non-kin contracts have significantly higher value. Single asterisk (*), double asterisks (**), and triple asterisks (***) denote significance at 10%, 5%, and 1%, respectively. "n.s." means that the differences between kinship and non-kin contracts are not significantly different.

raise their farming efficiency and generate higher labor productivity. In turn, this is expected to promote more broad-based economic development (Wen, 2010).

Despite recent rapid growth in China's agricultural land rental market, past studies have consistently found that the market is performing below its full potential. For example, Deininger and Jin (2005) found that the share of households who desired to participate in land rental activities was much higher than the share of those who actually participated in land rental. Jin and Deininger (2009) found that land transfers through the land rental market are associated with significant transaction costs (possibly due to local restrictions on land rental participation). Similarly, Kimura et al. (2011) found that farmers were not able to attain the optimal land–labor ratio through land rental transactions.

Besides its underperformance in terms of market participation, another feature of China's land rental market is the high level of informality. Most of the rental contracts after the late 1990s are both oral and seasonal, although sometimes they are annual (Gao, Huang, & Rozelle, 2012; Jin & Deininger, 2009). Another survey in China shows that the pattern of land transfers, in terms of length of transfer, does not differ greatly in 2001, 2005, and 2008. In 2008, the dominant category remains "at will" transfers, accounting for 53.7% of all transfers out. At the same time, nearly four-fifths (79.1%) of the transfers out were to people within the village (Prosterman et al., 2009). Our data yield similar findings (Tables 5a and 5b). Additionally, we notice that over half of the transactions are between relatives, which might be regarded as the source of other informalities. In Table 1, we show the cross tabulation of informal features and kinship contract for all our rent-out samples.

Past empirical research about the efficiency of land transfers to non-relatives has offered mixed results. Sadoulet, de Janvry, and Fukui (1997) found kinship sharecropping contracts are more efficient than non-kin sharecropping contracts. Using survey data from Northern Ethiopia, Holden and Ghebru (2006) found that access by tenants was less constrained in communities with a high share of kinship. However, the coefficients for own land in contracts among kin is similar to that of contracts among non-kin indicating that land transfer among kin is as efficient as among non-kin. Kassie and Holden (2007) found land productivity is higher for non-kin-rented land than for kin-rented land and the output value distribution for non-kin-rented land first-order stochastically dominates that for kin-rented land. Theoretically, Macours et al. (2012) show that, if contract enforcement decreases with social distance, then insecure land rights will make landlords prefer tenants with similar social status, in order to reduce the risk of losing land; at the same time, with a limited choice of tenants, there would be a loss in efficiency.

3. Data and approach

3.1. Data

This paper uses data that were collected from a two-round nationwide survey in China. The first round was carried out in December 2000 (data for calendar year 2000), while the second was in early 2009 (data for calendar year 2008).

In the 2000 survey, 60 villages from six provinces (Hebei, Hubei, Liaoning, Shaanxi, Sichuan and Zhejiang) were selected. The six provinces are located in the major agricultural regions in China. To ensure broad coverage within each province, from within each income quintile (measured by the gross value of industrial output) for the province, one county was randomly selected. Then, within each county, two villages were randomly selected. A total of 1200 households were surveyed (six provinces * five counties per province * two villages per county * 20 households per village). Among the 1200 households, 1189 households that have full information are used in this paper.

In the 2009 survey, the enumerators went back to the same households that were surveyed in 2000.³ A total of 1046 households from the original 1200 households were found and resurveyed in 2009.

³ Two sample villages in Sichuan were completely destroyed by the earthquake in 2008, and therefore were not included in the 2008 sample.

For both rounds of the survey, nearly the same questions were asked to collect detailed information on the demographics, wealth, land and agricultural production, and off-farm employment of the households. Several sections of the household survey were designed to collect information about tenure security. All of the households in the sample were asked whether there were any land readjustments in the village in the previous 5 years, divided into two categories – namely, major and minor readjustments. Major readjustments involve all land in the entire village being taken back by village officials and then redistributed among all villagers based on household size, labor endowment, or the combination of the two. Minor readjustments involve land being taken back from a few households and reallocated in response to demographic changes (e.g., birth or death of a family member, etc.). Minor readjustments typically do not affect the entire village's landholding pattern (Zhu et al., 2006).

For the 2009 survey, information about issuance of land documents was collected. The households were asked, for instance, if they had land certificates/contracts and when they received these documents.

Another section of the survey focused on land transfer behavior. If the household rented in/out land, enumerators questioned them about the features of the contracting arrangement between lessor and lessee: the relationship between them (relative or non-relative), oral or written contract, fixed-term contract or not, and length of term in years.

3.2. Econometric approach

To estimate the effects of tenure security on the lessor's choice of lessee, we use a probit specification in which the probability of renting to a non-relative lessee for a rented out plot⁴ is modeled as a function of household characteristics, plot characteristics and tenure security:

$$\Pr(y_{ijt} = 1) = \Phi(\beta_0 + \beta_1 x_{ijt} + \beta_2 w_{it} + \beta_3 z_{it} + \beta_4 t_{00} + \beta_5 w_{it} * t_{00} + \beta_6 z_{it} * t_{00} + C_i + u_{it}) \quad (1)$$

where y_{ijt} is a dummy variable that takes a value of one if household i actually rented this plot j to a non-relative lessee at time t . x_{ijt} is a vector of controls for household i 's plot j at time t that include household characteristics such as household size, any changes to the household size since the beginning of the t period, number of rooms in the home, number of plots allocated to the household, and education level of the household head, as well as plot characteristics such as the area of the plot, length of years possessing that plot, distance from home to the plot, soil quality and irrigation status of the plot. w_{it} is the possession of land documents. According to the law, each household should be issued both land use rights contracts and land use rights certificates for all their plots.

We estimate four model specifications depending on how w_{it} is defined in each of the specifications. In the first three specifications, w_{it} is included as a single variable, respectively, a dummy variable doc_{it} ($= 1$ if the household i has at least one document at time t ; $= 0$ otherwise), a dummy variable $cert_{it}$ ($= 1$ if the household i has land certificate at time t ; $= 0$ otherwise), and a dummy variable $contract_{it}$ ($= 1$ if the household i has land contract at time t ; $= 0$ otherwise). In the fourth model specification, two dummy variables, $doc1_{it}$ ($= 1$ if the household i has one document at time t ; $= 0$ otherwise) and $doc2_{it}$ ($= 1$ if the household i has two documents at time t ; $= 0$ otherwise), are included. Another index of tenure security is z_{it} , which tells us whether the household i at time t experienced any major/minor land readjustments in the village within the last 5 years. We only consider administrative land readjustments at the village level, rather than past individual experiences of land readjustments here, as the latter are endogenous to past land rental choices. t_{00} is a time dummy which takes one for plots surveyed in 2000. To investigate the time trend of the effects of tenure security, we also include the interaction terms of w_{it} , z_{it} with t_{00} respectively. C_i is the unobservable household fixed effect, which might be correlated with the error term u_{it} .

With this specification, Hypothesis 1 and Hypothesis 3 in Section 2 can be rewritten as:

1. $\beta_2 > 0, \beta_3 < 0$
2. $\beta_5 < 0, \beta_6 > 0$

The standard probit estimation of Eq. (1) does not allow for correlation between the unobservable individual effect C_i and any of the right-hand-side covariates. As this may be unrealistic, we adopt the correlated random effects (CRE) model pioneered by Mundlak (1978) and Chamberlain (1980) to address the existence of c_i . Specifically, the CRE model allows correlation between C_i and means of a subset of the right-hand-side variables at the household level according to:

$$C_i = \gamma_0 + \gamma_1 \bar{x}_i + \gamma_2 \bar{z}_i + \varepsilon_i \quad (2)$$

where \bar{x}_i is the vector of the average of time-varying household and plot covariates for household i over two periods and all plots, \bar{z}_i is the average land adjustments situation among two periods, and ε_i is an error term.⁵ To fully capture the time-invariant heterogeneity,

⁴ Before choosing lessees, the land use rights holder first must decide whether to rent the land out or not. We run regression of land rental participation with specification similar to (1), and find significantly negative effects of major land readjustments and insignificant effects of land documents issuance. Regression results are available by request.

⁵ The reason that we do not include w_i in Eq. (2) is that, in our sample, while we have enough variance in possession of land documents among different households, the change of possession for the same household across the periods is rare (eight households with 43 plots have changes in their land use rights certificates, while four households with 26 plots have changes in their land use rights contracts). In this case, w_{it} is a rarely-changing variable, which is very similar to the time-invariant variable. If we add it in Eq. (2), it will significantly reduce the significance of β_2 , but in an inappropriate way. However, without w_i in Eq. (2), for our result to be unbiased, we need the additional assumption here: $E(C_i | \bar{x}_i, \bar{z}_i, w_i) = E(C_i | \bar{x}_i, \bar{z}_i)$. That is there is no unobservable factors that are systematically different between control and treatment after controlling all other \bar{x}_i and \bar{z}_i .

Table 2
Basic Characteristics of household.

	2000	2008
Age of household head (years)	45.28	52.85
Education of household head (years completed)	7.1	7.16
Number of persons	3.89	3.8
Number of rooms in home	6.5	6.2
Household land endowments (mu)	8.47	10.14
Value of total assets (yuan in 2000)	31512.57	115082
Share of agricultural assets	0.1	0.06
Average number of migrants	1.28	1.42
Number of observations (households)	1189	1046

Notes: The table compares household characteristics between 2000 and 2008. This paper uses data that were collected from a two-round nationwide survey in China. The first round was carried out in December 2000 (data for calendar year 2000), while the second was in early 2009 (data for calendar year 2008). In the 2000 survey, a total of 1200 households were surveyed. Among the 1200 households, 1189 households that have full information are used in this paper. In the 2009 survey, the enumerators went back to the same households that were surveyed in 2000. A total of 1046 households from the original 1200 households were found and resurveyed in 2009.

all that is required is that ε_i is independently and normally distributed with mean zero and variance σ_ε^2 (Deininger et al., 2011). Then we can estimate the modified Eq. (1) where C_i is replaced by the combination of \bar{x}_i and \bar{z}_i by the standard probit random effects model using panel data. Another advantage of this estimation methodology (known as CRE-probit model) is that it allows the model to include time-invariant variables or variables with little variation over time. This methodology has been used successfully by Holden et al. (2009) and Deininger et al. (2011) to estimate the effects of land certification on investment and land market participation in Ethiopia and by Ricker-Gilbert, Jayne, and Chirwa (2011) to estimate the effects of a government fertilizer subsidy program on overall fertilizer demand in Malawi.

As the main differences in document issuance exist at the village level, we also estimated village-level fixed-effect models to check the robustness of the results of the CRE models. However, there is a serious practical challenge in estimating the fixed-effect model in the context of a non-linear model. Specifically, fixed-effects models with limited dependent variables may suffer from the incidental parameter problem, which leads to biased estimators (Greene, 2004; Wooldridge, 2005). To overcome this methodological difficulty, we used a linear probability model rather than a probit model.

4. Descriptive evidence

Table 2 presents data for the primary household demographic and asset variables of our sample. Our data indicate that an average household has 3.8 members with very little variation between the two survey periods, and has a head whose age increased from 45 in 2000 to 53 in 2008 and who completed 7 years of education. The 8-year increase in the age of the household head and the fact that the household size and the level of head's education remained constant over the two survey periods is evidence that the attrition rate is very low for the panel data. The asset data suggest that an average household accumulated considerable wealth in the 8 years between the surveys. The average value of total household assets more than doubled (from 31,512 yuan in 2000 to 115,082 yuan in 2008). The share of agricultural assets declined slightly, from 10% in 2000 to 6% in 2008. The average number of migrants increased slightly from 1.28 to 1.42.

4.1. Weak tenure security

As noted earlier, current Chinese law requires the issuance of rural land use rights contracts ("contracts") and rural land use rights certificates ("certificates") to farmers to confirm their land use rights. A contract is designed by a local people's governments at or above the village level and is completed at the village level. It contains the signatures or seals of an official of the village collective and of the contracting farm household. The specific content of the contracts issued in different villages varies considerably. By contrast, land use rights certificates are typically designed by provincial governments and include consistent content and format across the province. Certificates contain the seal of the county government, they require no signature from the contracting farmer (Prosterman et al., 2009). Our data (Table 3a) show that, as of 2008, 67% of respondents had been issued certificates and 59.35% of respondents had been issued contracts. Among the respondent households, 49.06% had been issued both documents.⁶ Altogether, 77.2% had been issued at least one document, leaving 22.22% who had received no document whatsoever. The issuance rate for both documents has doubled since 2000. Yet, considerably more work needs to be done to assure that each rural household receives

⁶ Under the terms of the 2003 Rural Land Contracting Law (RLCL), the certification of land use rights should be based on the prior issuance of a land use rights contract. Only rural households who have received land use rights contracts in the village should receive a land use rights certificate from the county or provincial government. In our experience the processes of issuing land use rights certificates and land use rights contracts have been largely independent of each other. Notwithstanding any provisions in the RLCL to the contrary, the issuance of land use rights certificates does not appear to have been consistently linked to the prior issuance of land use rights contracts. Our data are consistent with the findings in a series of six surveys of land use rights in 17 rural provinces in China which consistently report higher issuance rates for land use rights certificates than for land use rights contracts (Prosterman et al., 2009).

Table 3a
Tenure security in China in 2000/2008.

	(1)	(2)	(3)	(4)
	2000		2008	
	Total	With land rented out	Total	With land rented out
Have certificate (percent)	33.93	27.97	66.54	67.00
Have contract (percent)	32.99	26.57	59.35	58.62
Have both certificate and contract (percent)	28.33	26.67	49.06	47.03
Have at least one document (percent)	43.46	34.97	77.2	78.82
Have no documents at all (percent)	47.52	52.38	22.22	20.79
Number of observations (households)	886	105	1062	202
With some major land readjustments in the village in last five years (percent)	31.11	30.07	3	2.96
With some minor land readjustments in the village in last five years (percent)	34.36	37.06	12.92	4.43
Number of observations (households)	1189	143	1046	203

Note: The data is from a two-round (1st round in 2000, and 2nd round in 2008) nationwide survey in China. The table compares tenure security for all households (Columns 1 and 3) and households with rented-out plots (Columns 2 and 4) in 2000 and 2008 respectively.

Table 3b
Possession of land use rights documents by province.

	Hebei	Shaanxi	Liaoning	Zhejiang	Sichuan	Hubei
<i>2000</i>						
Certificate only (%)	13.46	20.71	8.29	18.06	12.73	4.52
Contract only (%)	5.77	20	14.92	9.72	18.18	2.58
Both (%)	46.79	19.29	38.12	29.86	24.55	7.74
Neither (%)	33.97	40	38.67	42.36	44.55	85.16
Number of observations (households)	156	140	181	144	110	155
<i>2008</i>						
Certificate only (%)	17.01	23.86	9.09	30.05	11.76	15.38
Contract only (%)	4.64	19.32	12.83	8.2	12.42	7.69
Both (%)	53.61	31.82	59.36	40.44	61.44	48.52
Neither (%)	24.74	25	18.72	21.31	14.38	28.4
Number of observations (households)	194	176	187	183	153	169

Notes: The data is from a two-round (1st round in 2000, and 2nd round in 2008) nationwide survey in China. Each cell shows the percentage of households that have received the specified document(s) in that province.

both documents as required by law and policy. The top panel of [Table 3b](#) shows that Hubei province is an outlier in terms of the proportion of households (85.2%) that had received neither document as of 2000. Comparable data for the other five provinces ranges from 34% to 44%. The 2008 survey data show little variation across the six provinces in terms of issuance of land documents (bottom panel of [Table 3b](#)) or perception of the implementation of the 2003 RLCL ([Appendix Table 1](#)).⁷

[Fig. 1](#) shows the timing of contract and certificate issuance since the initial announcement of the 30-year policy (1997), with the vertical scale showing the number of households issued a certificate or contract in that year.

Our survey data also show that the incidence of land readjustments has declined considerably over the two survey periods (bottom panel of [Tables 3a](#) and [3b](#)). The share of households who experienced some major (or minor) land readjustments in the village in the last 5 years has decreased from 31% (34%) in 2000 to 3% (13%) in 2008. This reduction in the frequency of government-administered land readjustments (especially major readjustments) suggests a noticeable improvement in China's land tenure security after the RLCL became effective in 2003.

4.2. Immature rental market

Consistent with previous studies, our descriptive statistics show a rapid development in land rental markets in recent years ([Table 4](#)) and point out the informal features in contracting forms ([Tables 5a, 5b](#)). Land rental markets were utilized by over 10% of households in 2000, and by 20% of households in 2008. Rental participation rates are generally higher in developed countries, e.g. 44% in the United States ([Gao et al., 2012](#)). However, the rental participation rate in China in 2008 compares favorably with that in other developing countries (e.g., 7% in Columbia, 12% in India, 16% in Vietnam), some of which have much more unequal distribution of land than China ([Gao et al., 2012](#); [Vranken & Swinnen, 2006](#)). In 2000, in those instances (31.23%) where rent was charged the average rent was 275.15 yuan/mu. Interestingly, 52.79% (71.48%) of respondent households expressed a willingness to rent out their plots at 200 (300) yuan/mu, far exceeding the proportion (11.93%) who reported actually doing so. The gap between willingness to rent and actually renting is much smaller in 2008. Where charged, the average rent in 2008 was 221.57 yuan/mu. The percentage

⁷ As Hubei province behaves considerably different from the rest of provinces in terms of document issuance, we also ran a set of regressions without Hubei province. The results remain largely unchanged ([Appendix Table 2](#)).

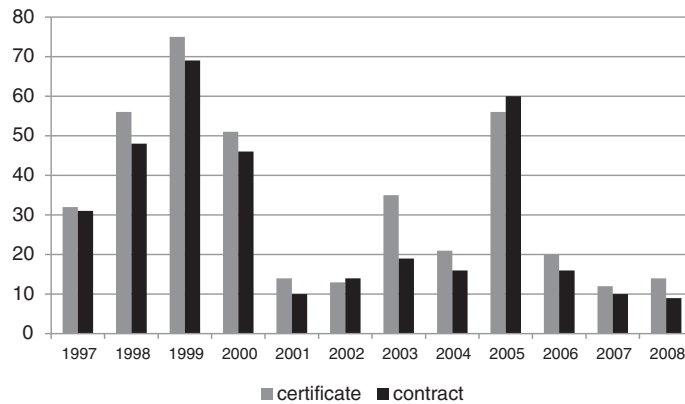


Fig. 1. Timing of contract and certificate issuance. Notes: The data is from a two-round (1st round in 2000, and 2nd round in 2008) nationwide survey in China. Each bar represents the number of households issued a land use rights certificate or contract in the corresponding year.

Table 4

Descriptive evidence on household participation in agricultural land rental markets.

	2000	2008
<i>1. Participation in rental markets</i>		
Are renting in land now (%)	16.95	27.2
Are renting out land now (%)	11.93	18.97
<i>2. Area transacted per household</i>		
Area rented in (mu)	0.61	2.1
Area rented out (mu)	0.33	0.65
Number of observations (households)	1189	1046

Notes: The data is from a two-round (1st round in 2000, and 2nd round in 2008) nationwide survey in China. Participation rate in renting in(out) land = number of households with land rent in(out) / total number of households in the sample; area transacted per household = total area transacted in the whole sample / sample size.

of households willing to rent out land at a rate of 200 (300) yuan/mu was 25.05% (42.24%), which is much closer to the reported rate (18.97%) of land rental.

Although participation in the China's land rental market may be reasonable by world standards,⁸ there are other concerns for the market, which are evident in some of the contracting arrangements for rented-out land (Tables 5a and 5b). Despite the rapid growth in participation in the land rental market, some of the key contractual arrangements are changing very slowly. Specifically, rental transactions between relatives accounted for 46.64% of all transactions in 2000 and remained essentially the same in 2008 (46.32%). In 2000, 86.71% of all transactions did not specify the length of the contract period. Even more transactions (87.58%) failed to specify the contract period in 2008.

There were, however, several improvements in features of the land rental market. For example, rental transactions within a village—which were nearly universal (96.65%) in 2000—declined to 85.47% in 2008. There was also a decrease in the percentage of oral contracts, from 96.05% in 2000 to 89.05%, and an increase in formal written contracts in 2008. For those contracts which specified a fixed-term, the contract term was longer in 2008. Perhaps most importantly, there was a substantial increase in the proportion of rental arrangements that involved payment of rent (up from 31.23% in 2000 to 41.05% in 2008), even as the average amount paid in rent declined (from 275.15 yuan/mu to 221.57 yuan/mu).

Tables 5a and 5b also offer some intriguing insights into the evolving relationship between tenure security and land rental contracting arrangements in rural China. In 2000, there was little variation in land rental contracting arrangements across households, regardless of their security of tenure, whereas in 2008 there was substantial variation. In 2008, households that had received land use rights certificates and contracts were less likely to rent out their land to relatives or to people in the same village, use oral contracts, or rent out their land without specifying the period of the lease. Much the same pattern can be observed among households living in villages that had experienced no administrative readjustments.⁹

These findings encourage us to call attention to the importance of analyzing the quality, not just the quantity, of land rental market developments in China, as well as the time trends.

⁸ Deininger and Jin (2005) suggest that land rental participation does not depend exclusively on improved or enforceable property rights, but is also driven by off-farm development and labor migration. Our analysis does not include these factors.

⁹ The only exception is that the percentage of oral contracts is higher for households located in villages that had not experienced land readjustments.

Table 5a

Nature of the contracting arrangement for rented-out land in China in 2000.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All	One document	Both documents	No documents	Major readjustment	Minor readjustment	No adjustment
<i>Land rented out to:</i>							
Relatives (%)	46.64	34.88	41.46	55.56	48.1	31.71	58.7
Non-relatives (%)	53.36	65.12	58.54	44.44	51.9	68.29	41.3
People within the village (%)	95.65	97.67	100	95.56	100	91.46	95.65
People outside the village (%)	4.35	2.33	0	4.44	0	8.54	4.35
<i>Contractual type:</i>							
Oral (%)	96.05	94.19	92.68	96.67	98.73	92.68	96.74
Written (%)	3.95	5.81	7.32	3.33	1.27	7.32	3.26
<i>Contractual period:</i>							
No fixed term (%)	86.71	93.02	87.8	80	81.01	92.68	84.78
Average # of years that household has rented out the plot	3.67	3.03	3.47	5.25	3.02	3.96	3.91
Fixed term (%)	13.83	6.98	12.2	20	18.99	7.32	15.22
Average # of years that household has rented out the plot	1.83	1	1	1.33	1.4	1.33	2.5
Average years specified in the contract	4.46	1.33	1.4	3.17	1.53	8	6.07
<i>Rent:</i>							
Rent free (%)	68.77	73.26	63.41	55.56	65.82	64.63	75
Rent charged (%)	31.23	26.74	36.59	44.44	34.18	35.37	25
Average amount when rent charged	271.75	246.43	202.2	298.79	224.81	195.3	416.61
Number of observations (plots)	253	86	41	90	79	82	92

Notes: The data is from a two-round (1st round in 2000, and 2nd round in 2008) nationwide survey in China. The data used in calculating this table is at the plot level, for rented-out plots only. Columns 1–4 are for plots held by all households, households with at least one land use rights document, households with both land use rights documents, and households with no land use rights documents respectively. Columns 5–7 are for plots located in villages with major land readjustments, minor land readjustments only, and no land readjustments respectively.

5. Econometric results and discussions

The determinants of the lessor's choice of lessee (Eq. (1)) is estimated by pooled probit model (assuming C_i is uncorrelated with \mathbf{x}_{ijt} , w_{it} and z_{it}) and correlated random effects probit model (assuming Eq. (2) holds) while using different variables to control for the

Table 5b

Nature of the contracting arrangement for rented-out land in China in 2008.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All	1 document	Both documents	No documents	Major adjustment	Minor adjustment	No adjustment
<i>Land rented out to:</i>							
Relatives (%)	46.32	40.91	38.81	64.21	76.47	46.15	45.65
Non-relatives (%)	53.68	59.09	61.19	35.79	23.53	53.85	54.35
People within the village (%)	85.47	83.42	78.08	92.63	100	96.15	84.24
People outside the village (%)	9.89	10.7	13.24	7.37	0	0	10.82
<i>Contractual type:</i>							
Oral (%)	89.05	86.36	86.3	98.95	82.35	100	88.94
Written (%)	10.95	13.64	13.7	1.05	17.65	0	11.06
<i>Contractual period:</i>							
No fixed term (%)	87.58	86.1	85.84	92.63	100	61.54	88.47
Average # of years that household has rented out the plot	4.9	4.98	4.6	4.54	2.53	5.63	4.99
Fixed term (%)	12.42	13.9	14.16	7.37	0	38.46	11.53
Average # of years that household has rented out the plot	2.62	2.39	3.1	4.29	n/a	1	2.95
Average years specified in the contract	8.63	7.65	8.68	15.86	n/a	1	10.18
<i>Rent:</i>							
Rent free (%)	58.95	58.56	59.82	57.89	64.71	65.38	59.06
Rent charged (%)	41.05	41.44	40.18	42.11	35.29	34.62	40.94
Average amount when rent charged	221.57	211.97	232.5	258.26	96.67	133.33	229.52
Number of observations (plots)	468	374	219	95	17	26	425

Notes: The data is from a two-round (1st round in 2000, and 2nd round in 2008) nationwide survey in China. The data for calculating this table is at plot level, for rented-out plots only. Columns 1–4 are for plots held by all households, households with at least one land use rights document, households with both land use rights documents, and households with no land use rights document respectively. Columns 5–7 are for plots located in villages with major land readjustments, minor land readjustments only, and no land readjustments respectively.

Table 6

Variable descriptions for farm-plot panel data.

Variable	Description	2000		2008	
		Mean	SD	Mean	SD
area	Area of the plot (mu)	1.58	2.34	1.5	1.75
tenure	Years for holding that plot	14.2	7.47	16.9	9.02
distance	Distance of that plot from home, 1 = distance > = 0.5km.	0.55	0.5	0.19	0.4
quality	Soil quality, 1 = medium or high, 0 = o.w.	0.74	0.44	0.74	0.44
irrig	Irrigation status, 1 = available, 0 = o.w.	0.54	0.5	0.57	0.5
hhsize	Household population	3.56	1.34	3.5	1.39
hhchange	Any change of population in this household since the beginning of this year, 0 = no change, 1 = have change	0.05	0.22	0.09	0.28
nrooms	Number of rooms in the household's home	6.86	4.56	6.62	4.29
nplot	Number of plots allocated to the household	4.58	2.25	5.03	2.65
educ	Number of years of formal education completed by the head of the household	8.25	11.42	7.01	3.12
y00	Time dummy, 0 = 2008, 1 = 2000	1	0	0	0
major_adj	Dummy for major land readjustments in the village in the last five years, 0 = no, 1 = yes	0.32	0.47	0.04	0.19
major_adj*y00	Interaction term of major_adj*y00	0.32	0.47	0	0
minor_adj	Dummy for minor land readjustments in the village in the last five years, 0 = no, 1 = yes	0.35	0.48	0.06	0.24
minor_adj*y00	Interaction term of minor_adj*y00	0.35	0.48	0	0
doc	= 1 if the household i has at least one document at time t; = 0 otherwise	0.47	0.5	0.8	0.4
doc*y00	Interaction term of doc*y00	0.47	0.5	0	0
cert	= 1 if the household i has land certificate at time t; = 0 otherwise	0.39	0.49	0.69	0.46
cert*y00	Interaction term of cert*y00	0.39	0.49	0	0
contact	= 1 if the household i has land contract at time t; = 0 otherwise	0.31	0.46	0.58	0.49
contract*y00	Interaction term of contract*y00	0.31	0.46	0	0
doc1	= 1 if the household has one document at time; = 0 otherwise	0.17	0.38	0.32	0.47
doc1*y00	Interaction term of doc1*y00	0.17	0.38	0	0
doc2	= 1 if the household has two documents at time ; = 0 otherwise	0.17	0.37	0.46	0.50
doc2*y00	Interaction term of doc2*y00	0.17	0.37	0	0
Number of obs		253		468	

Notes: The data is from a two-round (1st round in 2000, and 2nd round in 2008) nationwide survey in China. The data for calculating this table is at plot level, for rented-out plots only. First panel is about plot characteristics; second panel shows variables on household characteristics; and third panel describes tenure security.

issuance of land use rights documents. The variable descriptions are displayed in Table 6. The results for pooled probit regression are presented in the left panel of Table 7. The results of correlated random effect probit model, which controls for endogeneity in the issuance of land documents, are presented in the right panel of Table 7. The models performed well and produced results that largely support our three hypotheses. The effects of the many control variables also are as expected.

5.1. Land documents and land adjustments

First, as predicted, in the right panel of Table 7, the correlations between the issuance of documents (doc), certificates (cert), contracts and both documents (doc2) respectively and land transfers to non-relatives are significantly positive. That is, more secure land rights are associated with increases in land transfers to non-relatives. Having both land use rights documents has a more positive impact on such transfers. And issuance of a land use rights contract is more positively associated with land transfers to non-relatives than is issuance of a land use rights certificate. In terms of the magnitude of the effect, having at least one document increased the probability that a lessor would rent land out to a non-relative lessee by 14% in 2008 (Column 5, Table 7).

Our first hypothesis can be explained by the argument that in the absence of formal tenure security, lessors prefer renting out land to relatives because it is easier to prevent squatting in the case of relatives than non-relatives. People in kinship relationships depend on each other for other services and interactions, such as loans, referrals on labor markets, and mutual insurance (Macours et al., 2010). However, with formal tenure security, it is easier to prevent squatting by relatives and non-relatives alike. In turn, there is less reason for lessors to privilege transfers to relatives over transfers to non-relatives. Put differently, informal land transfers and formal titling are substitutes for each other (Lanjouw & Levy, 2002). In the absence of formal titling, lessors need more informal land security, which can be achieved by limiting land transfers to relatives. With more secure land rights, people do not need to limit their land transfers to relatives; they can instead choose the potential lessee with the highest productivity. In turn, the probability of renting to a non-relative is higher.

For Hypothesis 2, our reasoning is that the more law-compliant documents provide more tenure security to the household. Current Chinese law requires the issuance of both land use rights certificates and land use rights contracts. Possession of both documents reflects greater provincial and village level compliance with the law. In turn, households receiving both documents should have greater security of land tenure than households receiving only one of the two documents. Among the latter households, those receiving land use rights contracts should have a greater sense of tenure security than those receiving only land use rights certificates because contracts contain the signatures or seals of a village official and a household member whereas the certificates generally do not. Again,

Table 7
Determinants of land transfers to non-relatives.

	Pooled probit				Correlated random probit			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
area	0.013 (0.011)	0.012 (0.011)	0.011 (0.011)	0.012 (0.011)	0.03 (0.017)*	0.031 (0.019)*	0.039 (0.022)*	0.019 (0.013)
tenure	-0.011 (0.003)***	-0.011 (0.003)***	-0.01 (0.003)***	-0.01 (0.003)***	-0.004 (0.006)	-0.004 (0.006)	-0.005 (0.007)	-0.002 (0.004)
distance	0.058 (0.060)	0.058 (0.059)	0.036 (0.061)	0.064 (0.058)	-0.042 (0.069)	-0.06 (0.076)	-0.027 (0.086)	-0.043 (0.047)
quality	-0.087 (0.062)	-0.072 (0.062)	-0.081 (0.064)	-0.116 (0.060)*	-0.001 (0.061)	-0.002 (0.063)	0.001 (0.077)	0.003 (0.043)
irrig	0.101 (0.057)*	0.082 (0.057)	0.092 (0.058)	0.075 (0.055)	0.156 (0.067)**	0.206 (0.084)**	0.215 (0.097)**	0.123 (0.051)**
hhsz	0.04 (0.023)*	0.041 (0.023)*	0.041 (0.022)*	0.039 (0.022)*	0.373 (0.091)***	0.367 (0.102)***	0.347 (0.140)**	0.261 (0.076)***
hhchange	-0.136 (0.108)	-0.132 (0.110)	-0.112 (0.106)	-0.116 (0.105)	-0.712 (0.052)***	-0.669 (0.039)***	-0.632 (0.062)***	-0.606 (0.177)***
nrooms	0.019 (0.008)**	0.022 (0.008)***	0.019 (0.008)**	0.022 (0.008)***	-0.043 (0.024)*	-0.055 (0.024)**	-0.044 (0.049)	-0.027 (0.024)
nplot	-0.031 (0.012)***	-0.034 (0.012)***	-0.031 (0.012)***	-0.027 (0.011)**	0.048 (0.043)	0.089 (0.050)*	0.084 (0.054)	0.04 (0.034)
educ	0.012 (0.011)	0.012 (0.011)	0.013 (0.011)	0.001 (0.011)	-0.044 (0.054)	-0.042 (0.042)	0.033 (0.063)	-0.014 (0.032)
y00	-0.038 (0.125)	-0.109 (0.110)	-0.091 (0.103)	0.039 (0.118)	0.234 (0.069)***	0.133 (0.077)*	0.162 (0.123)	0.206 (0.093)**
major_adj	-0.231 (0.182)	-0.268 (0.165)	-0.245 (0.176)	-0.211 (0.185)	-0.671 (0.142)***	-0.516 (0.170)***	-0.579 (0.143)***	-0.513 (0.180)***
major_adj*y00	0.235 (0.171)	0.281 (0.149)*	0.25 (0.164)	0.144 (0.206)	-0.046 (0.223)	-0.423 (0.174)**	-0.07 (0.344)	-0.096 (0.144)
minor_adj	-0.041 (0.170)	-0.04 (0.174)	0.063 (0.209)	-0.028 (0.177)	-0.149 (0.245)	-0.468 (0.195)**	-0.085 (0.278)	-0.098 (0.135)
minor_adj*y00	0.222 (0.175)	0.2 (0.184)	0.131 (0.238)	0.08 (0.207)	-0.561 (0.113)***	-0.383 (0.269)	-0.411 (0.224)*	-0.351 (0.228)
doc	0.219 (0.095)**				0.146 (0.084)*			
doc*y00	-0.128 (0.128)				-0.226 (0.147)			
cert		0.134 (0.083)				0.203 (0.089)**		
cert*y00		-0.08 (0.122)				0.053 (0.097)		
contract			0.163 (0.078)**				0.275 (0.126)**	
contract*y00			-0.074 (0.121)				-0.371 (0.153)**	
doc1				0.172 (0.097)*				-0.02 (0.093)
doc1*y00				-0.053 (0.143)				-0.105 (0.121)
doc2				0.236 (0.091)***				0.231 (0.073)***
doc2*y00				-0.149 (0.140)				-0.268 (0.156)*
# of Obs.	580	576	585	648	568	564	573	636

Notes: The data is from a two-round (1st round in 2000, and 2nd round in 2008) nationwide survey in China. Descriptions of variables are reported in Table 6; Standard errors are clustered at household level. Single asterisk (*), double asterisks (**), and triple asterisks (***) denote significance at 10%, 5%, and 1%, respectively.

more secure land rights reduce the demand for the informal security associated with limiting land transfers to relatives, and thus raise the probability of renting out land to non-relatives.¹⁰

When it introduced the household responsibility system in the late 1970s, China provided localities with some flexibility in their management of agricultural land, allowing village officials to make periodic readjustments to household land holdings under certain conditions (Kung & Liu, 1997). The right of local authorities to engage in such administrative reallocations was limited by revisions to the

¹⁰ Columns 4 and 8 in Table 7 show that ignoring the endogeneity of land document issuance would overestimate the effects of having only one document (either a land use rights contract or a land use rights certificate). However, failing to address omitted variable bias should not cause a significant bias on the effects of having two land documents. This is evidenced by the coefficients on *doc2*, which are very similar for pooled probit and correlated random effect probit models. The results also show that the negative effects of administrative land readjustments on transfers to non-relatives would be underestimated if the endogeneity of tenure security were not addressed. This finding is in line with the fact that land transfers between relatives reduce the demand for administrative land adjustments, while land transfers between non-relatives have no such effect and may have the opposite effect.

Land Management Law in 1998, which required that such reallocations be approved by two thirds of the village members. In 2003, the RLCL put an end to such administrative land readjustments in China in all but extreme cases (Zhu et al., 2006). However, various surveys and our own data show that inappropriate land readjustments continue to occur, albeit with notably less frequency. The existing literature shows that these land readjustments pose a major threat to land tenure security in rural China (Deininger & Jin, 2005, 2009; Zhang et al., 2004). Following our logic above, more land readjustments reduce the probability of land transfers to non-relatives.

5.2. Timing trend of the effects

The significantly negative signs of the variables “doc*y00”, “contract*y00” and “doc2*y00” show that the incentive effect of land documents is significantly greater in 2008 than that in 2000. Previous research argued that availability of land documents did not significantly reduce the risk of an unauthorized land readjustment, suggesting that such documents will only be useful within an appropriate institutional framework (Deininger & Jin, 2009). That is, with a better-framed law and a healthier legal environment, the positive effects of land documents would be strengthened. The RLCL gives land rights legal status as property rights, making it possible to seek redress for violations through the courts, increasing the enforceability and therefore the power of land documents.

At the same time, however, the interaction terms between land readjustments are generally not significant. This might indicate that land readjustments have always been a threat to tenure security, reducing the probability of transfers to non-relatives, and that threat remains in 2008 even though there are notably fewer readjustments and the RLCL of 2003 has strengthened legal protections for rural land use rights.

5.3. Plot characteristic and household traits

The signs for coefficients on other variables of plot characteristics and household traits are largely as expected. Coefficients on plot area and irrigation conditions are significantly positive, in line with the idea that households would rather rent out their land to non-relatives only if they can get significantly higher returns, which is less possible in the case of small plots with poor irrigation. The findings indicate that larger households are more likely to rent out their land to non-relatives, but households with changes in population are less likely to do so. These results may indicate that, when renting out is (not) a response to lack of labor, households are less (more) likely to rent it to non-relatives in order to get higher rent payments. The number of rooms in the household's home is negatively associated with renting to non-relatives. It may be that wealthier households are less concerned about the higher monetary benefits from renting land to non-relatives and are more responsive to requests from their relatives for assistance (in the form of renting them land). The number of plots owned by the household is positively correlated with land transfers to non-relatives. This finding is consistent with the notion when households have more plots, and the demand for land from their relatives is fixed, they can best achieve equilibrium through transfers to non-relatives.

5.4. Robustness check

Since the main differences in document issuance exist at the village level, we also estimated the village level fixed-effect models to check the robustness of our results. The main results of the village fixed-effect linear probability models (Table 8) are similar to the CRE models (right panel of Table 7). Another important finding here is that the village dummies are highly jointly significant. Thus, it would appear that villages vary considerably in renting behavior.

Besides the time-invariant unobservable C_i , there are also potentially other endogeneity concerns such as time-variant unobserved household fixed effects and the simultaneity that cannot be addressed by the CRE model. We were unable to find an appropriate instrument variable to directly tackle this problem. As an alternative, we conducted a bound analysis to estimate the bound of such effects by following an idea in Altonji, Elder, and Taber (2005), i.e., running parsimonious regressions without controlling for household and/or plot characteristics. Comparing the results from the parsimonious regressions (Table 9) with those in Table 7 reveals that the effects of both land document issuance and major land readjustments are similar whether or not we control for household and/or plot characteristics. These results suggest that the shift in unobservables would have to be very large in order to explain away the estimated effects of tenure security. Put differently, assuming that the unobserved effects are smaller than the observed effects, the estimated effects of tenure security on land transfers to non-relatives would not be significantly changed even if we were able to control for the time-varying unobserved effects.

6. Conclusion and implications

This paper is motivated by the observation that participation in rural land markets in China increased rapidly after the late 1990s, but the informal features of the market have changed at a notably slower rate. Further, in prior research, scholars have focused on the quantitative effects of land tenure security on the land rental markets, largely ignoring the qualitative effects. In this paper, we investigate the influence of land tenure security on lessors' choices in renting out land to non-relatives versus relatives. Using two period panel data from a survey of six provinces, and controlling for unobserved heterogeneity through the CRE model, we have three main findings:

First, as a measure to improve land security, the issuance of land use rights documents raises a household's probability of renting out their land to non-relatives rather than relatives, and this effect is stronger in 2008 than in 2000. Insofar as segmentation in the land renting market induces large productivity losses (Macours et al., 2010), breaking the restrictions in the choice of lessees by issuing more law-compliant land rights documents would be conducive to further agricultural development in China. The stronger effects in 2008 would also suggest that an appropriate institutional framework is important to achieve the full potential of issuing land use rights documents.

Table 8
Determinants of land transfers to non-relatives (village fixed effect).

	(1)	(2)	(3)	(4)
area	0.012 (0.014)	0.011 (0.015)	0.015 (0.014)	0.012 (0.014)
tenure	−0.004 (0.003)	−0.004 (0.003)	−0.004 (0.003)	−0.005 (0.003)**
distance	0.01 (0.051)	0.001 (0.051)	−0.004 (0.052)	0.005 (0.049)
quality	−0.016 (0.046)	−0.001 (0.047)	−0.008 (0.047)	−0.048 (0.046)
irrig	0.078 (0.052)	0.075 (0.052)	0.048 (0.052)	0.046 (0.049)
hysize	0.051 (0.019)***	0.051 (0.019)***	0.05 (0.019)***	0.044 (0.018)**
hhchange	−0.107 (0.071)	−0.117 (0.075)	−0.08 (0.069)	−0.099 (0.067)
nrooms	0.011 (0.006)*	0.012 (0.006)*	0.01 (0.006)	0.017 (0.006)***
nplot	−0.019 (0.009)**	−0.022 (0.010)**	−0.019 (0.010)**	−0.019 (0.009)**
educ	0.011 (0.008)	0.01 (0.008)	0.009 (0.008)	0.008 (0.008)
y00	0.097 (0.115)	0.042 (0.106)	0.033 (0.092)	0.02 (0.102)
major_adj	−0.56 (0.164)***	−0.614 (0.161)***	−0.544 (0.154)***	−0.547 (0.151)***
major_adj*y00	0.477 (0.205)**	0.535 (0.202)***	0.461 (0.192)**	0.407 (0.180)**
minor_adj	0.048 (0.114)	0.037 (0.115)	0.135 (0.136)	0.035 (0.112)
minor_adj*y00	−0.065 (0.158)	−0.079 (0.158)	−0.158 (0.172)	−0.108 (0.143)
doc	0.197 (0.078)**			
doc*y00	−0.212 (0.119)*			
cert		0.154 (0.075)**		
cert*y00		−0.153 (0.114)		
contract			0.151 (0.055)***	
contract*y00			−0.144 (0.101)	
doc1				0.062 (0.084)
doc1*y00				−0.002 (0.130)
doc2				0.177 (0.081)**
doc2*y00				−0.132 (0.125)
# of Obs.	568	564	573	636

Notes: The data is from a two-round (1st round in 2000, and 2nd round in 2008) nationwide survey in China. Descriptions of variables are reported in Table 6. Standard errors are clustered at household level. Single asterisk (*), double asterisks (**), and triple asterisks (***) denote significance at 10%, 5%, and 1%, respectively.

Second, more law-compliant documents have greater incentive effects on land transfers to non-relatives. A recent survey in 17 provinces in China found that, although a large majority of the issued documents are technically effective, only a minority can be considered strictly compliant with all of the legal requirements (e.g., adequately specifying the 30-year term, containing proper signatures and seals, and having an adequate description of the household's land parcels). Only 17.4% of issued contracts and 37.6% of issued certificates were considered strictly compliant with Chinese law (Prosterman et al., 2011). Thus, it will be important to enhance the quality of the land use rights document.

Third, a history of administrative land readjustments discourages households from renting out their land to non-relatives. Land readjustments remain a threat to land tenure security in China although the practice is severely restricted by the 2003 RLCL. This paper confirms that elimination of administrative land readjustments can improve the performance of China's land rental market.

Due to data limitations in the surveys, we only know whether a household has land documents or not; no information about the content of the documents was available. In the future, with more knowledge about the content of the documents, we can explore the

Table 9
Determinants of land transfers to non-relatives (with fewer controls).

	A. Without control for household features				B. Without control for plot features				C. Without control for household and plot features			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
y00	0.223 (0.163)	0.176 (0.156)	0.271 (0.132)**	0.282 (0.147)*	0.183 (0.172)	0.126 (0.151)	0.309 (0.107)***	0.25 (0.161)	0.303 (0.119)**	0.266 (0.117)**	0.312 (0.110)***	0.326 (0.110)***
major_adj	−0.308 (0.502)	−0.368 (0.428)	−0.397 (0.391)	−0.405 (0.378)	−0.606 (0.097)***	−0.624 (0.087)***	−0.652 (0.073)***	−0.651 (0.090)***	−0.459 (0.258)*	−0.475 (0.233)**	−0.533 (0.209)**	−0.528 (0.220)**
major_adj*y00	−0.079 (0.503)	−0.034 (0.464)	−0.079 (0.360)	−0.107 (0.370)	0.221 (0.195)	0.215 (0.180)	0.118 (0.203)	0.137 (0.181)	0.073 (0.324)	0.106 (0.298)	0.043 (0.286)	−0.028 (0.267)
minor_adj	0.003 (0.364)	−0.023 (0.350)	0.133 (0.211)	0.101 (0.367)	−0.422 (0.270)	−0.471 (0.200)**	−0.026 (0.258)	−0.138 (0.306)	−0.157 (0.315)	−0.181 (0.303)	0 (0.288)	−0.019 (0.303)
minor_adj*y00	−0.12 (0.471)	−0.093 (0.427)	−0.209 (0.334)	−0.134 (0.540)	−0.22 (0.430)	−0.209 (0.434)	−0.48 (0.189)**	−0.231 (0.351)	−0.158 (0.366)	−0.119 (0.361)	−0.217 (0.378)	−0.085 (0.359)
Doc	0.233 (0.197)				0.256 (0.181)				0.286 (0.166)*			
doc*y00	−0.247 (0.163)				−0.056 (0.194)				−0.196 (0.151)			
Cert		0.222 (0.159)				0.214 (0.162)				0.268 (0.141)*		
cert*y00		−0.184 (0.163)				0.07 (0.179)				−0.162 (0.150)		
contract			0.267 (0.145)*				0.279 (0.127)**				0.28 (0.135)**	
contract*y00			−0.456 (0.160)***				−0.445 (0.161)***				−0.38 (0.154)**	
doc1				0.034 (0.143)				0.038 (0.125)				0.088 (0.100)
doc1*y00				0.015 (0.156)				0.151 (0.180)				0.08 (0.110)
doc2				0.363 (0.163)**				0.339 (0.193)*				0.396 (0.120)***
doc2*y00				−0.474 (0.147)***				−0.483 (0.241)**				−0.479 (0.149)***
Household Characteristics	N	N	N	N	Y	Y	Y	Y	N	N	N	N
Plot Characteristics	Y	Y	Y	Y	N	N	N	N	N	N	N	N
# of Obs.	575	571	580	643	577	573	582	645	584	580	589	652

Notes: The data is from a two-round (1st round in 2000, and 2nd round in 2008) nationwide survey in China. Descriptions of variables are reported in Table 6. Standard errors are clustered at household level. Single asterisk (*), double asterisks (**), and triple asterisks (***) denote significance at 10%, 5%, and 1%, respectively.

effects of specific terms in those documents. It would also be useful to estimate the productivity effects of land transfers to non-relatives versus relatives.

Acknowledgments

The authors thank three anonymous referees and Li Ping from Landesa for providing insightful comments and suggestions to improve the original manuscript. The authors also gratefully acknowledge the data support from the Center for Chinese Agricultural Policy and financial support from the Office of the Provost at Michigan State University and the university's AgBioResearch. All errors remain the responsibility of the authors.

Appendix A

Appendix Table 1
Awareness of the 2003 Rural Land Contracting Law.

	Hebei	Shaanxi	Liaoning	Zhejiang	Sichuan	Hubei
Do you know about the implementation of the 2003 Rural Land Contracting Law?						
Yes (%)	27.04	21.91	27.27	38.04	34.84	30.59
No (%)	72.45	78.09	72.73	61.96	65.16	68.82
Total	196	178	187	184	155	170
Did the village collective publicize the implementation of the 2003 Rural Land Contracting Law?						
Yes (%)	29.08	11.8	28.88	34.78	18.71	30.59
No (%)	66.33	71.35	70.59	61.41	77.42	67.06
Total	196	178	187	184	155	170

Note: The data is from a two-round (1st round in 2000, and 2nd round in 2008) nationwide survey in China.

Appendix Table 2

Determinants of land transfers to non-relatives (excluding Hubei).

	(1)	(2)	(3)	(4)
Area	0.009 (0.011)	0.009 (0.011)	0.006 (0.011)	0.007 (0.011)
Tenure	-0.01 (0.003)***	-0.01 (0.003)***	-0.009 (0.004)**	-0.008 (0.003)**
distance	0.057 (0.063)	0.059 (0.062)	0.02 (0.063)	0.053 (0.061)
quality	-0.075 (0.063)	-0.047 (0.063)	-0.059 (0.064)	-0.086 (0.059)
irrig	0.158 (0.060)***	0.135 (0.059)**	0.156 (0.060)***	0.123 (0.059)**
hhsize	0.063 (0.023)***	0.069 (0.024)***	0.065 (0.023)***	0.068 (0.023)***
hhchange	-0.114 (0.110)	-0.121 (0.111)	-0.098 (0.107)	-0.099 (0.107)
nrooms	-0.037 (0.012)***	-0.04 (0.012)***	-0.038 (0.012)***	-0.033 (0.012)***
nplot	0.007 (0.007)	0.007 (0.007)	0.006 (0.008)	0.009 (0.007)
educ	0.01 (0.011)	0.007 (0.011)	0.01 (0.012)	-0.001 (0.012)
y00	0.072 (0.133)	-0.007 (0.126)	-0.005 (0.113)	0.18 (0.112)
major_adj	0.127 (0.257)	0.039 (0.276)	0.045 (0.282)	0.155 (0.251)
major_adj*y00	-0.177 (0.285)	-0.078 (0.290)	-0.085 (0.299)	-0.293 (0.250)
minor_adj	0.115 (0.185)	0.112 (0.188)	0.36 (0.109)***	0.159 (0.175)
minor_adj*y00	0.024 (0.228)	0.001 (0.232)	-0.282 (0.193)	-0.187 (0.209)
doc	0.289 (0.096)***			
doc*y00	-0.199 (0.127)			
cert		0.219 (0.085)**		
cert*y00		-0.133 (0.126)		
contract			0.178 (0.084)**	
contract*y00			-0.128 (0.125)	
doc1				0.21 (0.091)**
doc1*y00				-0.129 (0.150)
doc2				0.307 (0.087)***
doc2*y00				-0.245 (0.134)*
# of Obs.	479	475	484	535

Notes: The data is from a two-round (1st round in 2000, and 2nd round in 2008) nationwide survey in China. Descriptions of variables are reported in Table 6. Regressions use correlated random effect model. Standard errors are clustered at household level. Single asterisk (*), double asterisks (**), and triple asterisks (***) denote significance at 10%, 5%, and 1%, respectively.

References

- Alston, L. J., Libecap, G. D., & Schneider, R. (1995). Property rights and the preconditions for markets: The case of the Amazon frontier. *Journal of Institutional and Theoretical Economics*, 151(1), 89–107.
- Altonji, J. G., Elder, T. E., & Taber, C. R. (2005). Selection on observed and unobserved variables: Assessing the effectiveness of Catholic schools. *Journal of Political Economy*, 113(1).
- Besley, T. (1995). Property rights and investment incentives: Theory and evidence from Ghana. *Journal of Political Economy*, 103(5), 903–937.
- Brandt, L., Rozelle, S., & Turner, M. A. (2004). Local government behavior and property right formation in rural China. *Journal of Institutional and Theoretical Economics*, 160(4), 627–662.
- Chamberlain, G. (1980). Analysis of covariance with qualitative data. *Review of Economic Studies*, 47(1), 225–238.
- Chen, F., & Davis, J. (1998). Land reform in rural China since the mid 1980s. *Land Reform, Land Settlement, and Cooperatives*, 6(2), 123–137.
- de Soto, H. (2000). *The mystery of capital: Why capitalism triumphs in the West and fails everywhere else*. New York: Basic Books.

- Deininger, K. (2003). Land policies for growth and poverty reduction. In: World Bank Policy Research Report Series. World Bank, Washington DC, Oxford University Press, Oxford and New York.
- Deininger, K., & Jin, S. (2005). The potential of land rental markets in the process of economic development: Evidence from China. *Journal of Development Economics*, 78(1), 241–270.
- Deininger, K., & Jin, S. (2006). Tenure security and land-related investment: Evidence from Ethiopia. *European Economic Review*, 50(5), 1245–1277.
- Deininger, K., & Jin, S. (2009). Securing property rights in transition: Lessons from implementation of China's Rural Land Contracting Law. *Journal of Economic Behavior and Organization*, 70(1–2), 22–38.
- Deininger, K., Ali, D. A., & Alemu, T. (2011). Impacts of land certification on tenure security, investment, and land market participation: Evidence from Ethiopia. *Land Economics*, 87(2), 312–334.
- Do, Q. T., & Iyer, L. (2003). Land rights and economic development: Evidence from Vietnam. *World Bank Policy Research Working Paper*, No. 3120.
- Eggertsson, T. (1990). *Economic behavior and institutions*. New York and Melbourne: Cambridge University Press.
- Feder, G. (1988). *Land policies and farm productivity in Thailand*. Baltimore: Johns Hopkins University Press.
- Feder, G., & Feeny, D. (1991). Land tenure and property rights: Theory and implications for development policy. *World Bank Economic Review*, 5(1), 135–153.
- Gao, L., Huang, J., & Rozelle, S. (2012). Rental markets for cultivated land and agricultural investments in China. *Agricultural Economics*, 43(4), 391–403.
- Greene, W. (2004). Convenient estimators for the panel probit model: Further results. *Empirical Economics*, 29(1), 21–47.
- Haavelmo, T. (1960). *A study in the theory of investment*. Chicago: University of Chicago Press.
- Hayami, Y., & Ruttan, V. (1985). *Agricultural development: An international perspective*. Baltimore: Johns Hopkins University Press.
- Hilton, W. (1997). *Fanshen: A documentary of revolution in a Chinese village*. Berkeley: University of California Press.
- Holden, S. T., & Ghebru, H. H. (2006). Kinship, transaction costs and land rental market participation. *Working Paper, Norwegian University of Life Sciences, Ås*.
- Holden, S. T., Deininger, K., & Ghebru, H. (2009). Impacts of low-cost land certification on investment and productivity. *American Journal of Agricultural Economics*, 91(2), 359–373.
- Huang, P. C. C. (1995). Rural class struggle in the Chinese revolution: Representational and objective realities from the land reform to the cultural revolution. *Modern China*, 21(1), 105–143.
- Jacoby, H. G., Li, G., & Rozelle, S. (2002). Hazards of expropriation: Tenure insecurity and investment in rural China. *American Economic Review*, 92(5), 1420–1447.
- Jin, S., & Deininger, K. (2009). Land rental markets in the process of rural structural transformation: Productivity and equity impacts from China. *Journal of Comparative Economics*, 37(4), 629–646.
- Jorgenson, D. W. (1967). The theory of investment behavior. In R. Ferber (Ed.), *Determinants of investment behavior* (pp. 129–155). New York: Columbia University Press.
- Kassie, M., & Holden, S. (2007). Sharecropping efficiency in Ethiopia: Threats of eviction and kinship. *Agricultural Economics*, 37(2–3), 179–188.
- Kimura, S., Otsuka, K., Sonobe, T., & Rozelle, S. (2011). Efficiency of land allocation through tenancy markets: Evidence from China. *Economic Development and Cultural Change*, 59(3), 485–510.
- Kung, J. K. (2002). Off-farm labor markets and the emergence of land rental markets in rural China. *Journal of Comparative Economics*, 30, 395–414.
- Kung, J. K., & Liu, S. Y. (1997). Farmer's preferences regarding ownership and land tenure in post-Mao China: Unexpected evidence from eight counties. *China Journal*, 38, 34–63.
- Lanjouw, J. O., & Levy, P. (2002). Untitled: A study of formal and informal property rights in urban Ecuador. *The Economic Journal*, 112(482), 986–1019.
- Lin, Y. F. (1989). Rural factor markets in China: After the household responsibility system reform. In B. Reynolds (Ed.), *Chinese economic policy* (pp. 169–203). New York: Yale University Press.
- Lin, J. Y. (1992). Rural reforms and agricultural growth in China. *American Economic Review*, 82, 34–51.
- Lin, J. Y., & Yang, D. T. (2000). Food availability, entitlements and the Chinese famine of 1959–61. *Economic Journal*, 110(460), 136–158.
- Lopez, R. (1997). *Land titles and farm productivity in Honduras*. Washington, D.C.: The World Bank.
- Macours, K., de Janvry, A., & Sadoulet, É. (2010). Insecurity of property rights and social matching in the tenancy market. *European Economic Review*, 54(7), 880–899.
- McMillan, J., Whalley, J., & Zhu, L. (1989). The impact of China's economic reforms on agricultural productivity growth. *Journal of Political Economy*, 97(4), 781–807.
- Mundlak, Y. (1978). On the pooling of time series and cross section data. *Econometrica*, 46, 69–85.
- National Bureau of Statistics of China (2007). *The compilation of Second National Agricultural Census*. Beijing: China Statistics Press.
- North, D. C. (1990). *Institutions, institutional change, and economic performance*. New York: Cambridge University Press.
- Otsuka, K., & Hayami, Y. (1988). Theories of share tenancy: A critical survey. *Economic Development and Cultural Change*, 37(1), 31–68.
- Prosterman, R., Temple, M., & Hanstad, T. (1990). *Agrarian reform and grassroots development: Ten case studies*. Boulder and London: Rienner.
- Prosterman, R., Li, P., & Zhu, K. (2006). *China's regulatory framework on rural land: A review and recommendations*. Seattle: Rural Development Institute.
- Prosterman, R., Zhu, K., Ye, J., Riedinger, J., Li, P., & Yadav, V. (2009). *Secure land rights as a foundation for broad-based rural development in China: Results and recommendations from a seventeen-province survey*. NBR Special Report.
- Prosterman, R., Zhu, K., Ye, J., & Riedinger, J. (2011). Farmers' Land Rights in Today's China: From a Seventeen-Province Survey. In Li Lin (Ed.), *Annual Report on China's Rule of Law* (pp. 327–338). Beijing: China Academy of Social Sciences, China Social Academic Press.
- Putterman, L., & Skillman, G. L. (1993). Collectivization and China's agricultural crisis. *Journal of Comparative Economics*, 17(2), 530–539.
- Ricker-Gilbert, J., Jayne, T. S., & Chirwa, E. (2011). Subsidies and crowding out: A double-hurdle model of fertilizer demand in Malawi. *American Journal of Agricultural Economics*, 93(1), 26–42.
- Rozelle, S., Brandt, L., Guo, L., & Huang, J. (2002). Land rights in China: Facts, fictions, and issues. *China Journal*, 47(1), 67–97.
- Sadoulet, É., de Janvry, A., & Fukui, S. (1997). The meaning of kinship in sharecropping contracts. *American Journal of Agricultural Economics*, 79, 394–407.
- Vranken, L., & Swinnen, J. (2006). Land rental markets in transition: Theory and evidence from Hungary. *World Development*, 34(3), 481–500.
- Wen, J. (2010). *Government report of People's Republic of China*. Beijing: People's Publishing House.
- Wooldridge, J. M. (2005). Simple solutions to the initial conditions problem in dynamic, nonlinear panel data models with unobserved heterogeneity. *Journal of Applied Econometrics*, 20(1), 39–54.
- Yang, D. T. (1997). China's land arrangements and rural labor mobility. *China Economic Review*, 8(2), 101–115.
- Yao, S. (1999). A note on the causal factors of China's famine in 1959–1961. *Journal of Political Economy*, 107(6), 1365–1369.
- Zhang, Q., Ma, Q., & Xu, X. (2004). Development of land rental markets in rural Zhejiang: Growth of off-farm jobs and institutional building. *China Quarterly*, 180, 1050–1072.
- Zhang, Y., Wang, X., Glauken, T., & Brummer, B. (2011). The impact of land reallocation on technical efficiency: Evidence from China. *Agricultural Economics*, 42(4), 495–507.
- Zhu, K., Prosterman, R., Ye, J., Li, P., Riedinger, J., & Ouyang, Y. (2006). The Rural Land Question in China: An Analysis and Recommendations Based on a 17 Province Survey in 2005. *New York University Journal of International Law and Politics*, 38(4), 761–839.