

Measuring Transaction Costs in China's Rural Land Rental Market: Ex-Ante Bargaining associated with Ex-Post Contract Violation Uncertainty and Location Specificity

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Abstract

I measure the monetary value of transaction costs associated with China's mature rural land rental market, confirming rumors that have appeared in the literature of transaction costs in that market. Merging and extending transaction-cost theory and contract theory, I demonstrate that the ex-ante bargaining costs associated with contractual formality represent the main transaction costs in the market, functioning as a precautionary strategy that smoothes ex-post adaptation costs. In a three-step theory, I model the process through which transaction costs are generated. First, uncertainty regarding ex-post contract violations caused by non-agricultural income shocks and location specificity in China's scattered agricultural landscape result in conflicting partner preferences for contractual formality. Second, the compromise mechanism that facilitates efficient bargaining maximizes joint profits by making it more likely that the agent facing lower compromise costs is the one who compromises. Third, ex-ante bargaining costs are generated in inefficient bargaining when theoretically predicted agents refuse to compromise. Using a subsample of transactional-level data utilized in Yang (2020) that matches rental partners, I support my theory empirically and find that 18% of rental contracts experience ex-ante bargaining costs of 126.5 RMB and 35.4 RMB per year per mu, respectively, for renting-out agents' and renting-in agents' refusal to compromise.

Keywords: transaction costs, ex-ante bargaining, ex-post adaptation, rural land rental market

JEL: D23, O13, Q15

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Introduction

China initiated its rural land rental market in the late 1990s (Liu, Carter and Yao, 1998; Brandt et al., 2002; Kung, 2002; Zhang, Ma and Xu, 2004). This market has a great potential to reshape China's agricultural landscape as it shifts from smallholder production to larger-scale farming. Relevant studies find that transaction costs induced by China's transitional institutions impede further development of the market (Deininger and Jin, 2005; Jin and Deininger, 2009; Kimura, Otsuka and Rozelle, 2011). Existing studies have not yet, however, opened the black box of transaction costs in this market. The factors that create transaction costs associated with land rentals and the magnitude of those costs remain unclear. Thus, in China's rural land rental market, the extent to which transaction costs impede further market development remains an open question.

Transaction costs are rooted in uncertainty (North, 1991; Williamson, 2000). The primary source of uncertainty in any market generates the greatest proportion of transaction costs. Existing focusing on China's rural land rental market before the 2010s consider the country's rural land property rights framework the main source of uncertainty associated with land rentals (Deininger and Jin, 2005; Jin and Deininger, 2009; Kimura, Otsuka and Rozelle, 2011). In an insecure land property rights system, rural citizens hesitate to rent out their land because they are afraid that the land might be expropriated by renting-in agents or village administrations (Kung, 2002; Zhao, 2020). Therefore, the literature that focuses on the pre-2010 period regards market-entry transaction costs as the main transaction costs in China's rural land rental market. These costs were treated as exogenously determined fixed costs that limited market participation (Deininger and Jin, 2005; Jin and Deininger, 2009; Kimura, Otsuka and Rozelle, 2011; Chari et al., 2021).

Strengthening rural land property rights could greatly reduce market-entry transaction costs, thereby encouraging rental activities (Chari et al., 2021). In 2003, China's central government officially announced the Rural Land Contracting Law (RLCL), providing rural citizens with the right to enter into land rental transactions and discouraging village-led land adjustments (Li, 2003). Several nationwide surveys show that the probability that village-led land adjustments occur dropped to almost zero around 2008 (Gao, Huang and Rozelle, 2012; Wang, Riedinger and Jin, 2015; Zhao, 2020; Chari et al., 2021). To further strengthen rural land property rights, in 2018 China amended the RLCL to protect rural land property rights under rental transactions by separating the ownership rights, contractual rights, and management rights associated with rural land. In 2019, China completed its national project by issuing new high-quality land titles with GPS maps to all rural citizens with contracted land.

The abovementioned considerations mean that the security of rural land property rights is no longer the primary source of uncertainty in China's rural land rental market. Market-entry transaction costs have fallen dramatically. In 2020, more than 40% of Chinese farmland and more than 80% of land in coastal areas was involved in the rural land rental market (China Ministry of Agriculture [MOA], 2020). Are there, then, other non-negligible sources of uncertainty in China's rural land rental market that have impeded market development since the 2010s? In particular, with a continuously rising market participation rate, economic activities that occur after entering the rural land rental market become essential for promoting agricultural

efficiency and accelerating market development. The question remains, though, whether rental partners who enter the rural land rental market experience any type of uncertainty.

What is rarely noticed is that China's separated urban-rural social system that drives the emergence of China's rural land rental market also introduces uncertainty to that market. Because China's social separation policy has generated an enduring income gap between the urban and rural economies, rural citizens are attracted by non-agricultural employment. They rent their land out and rush into the urban economy. Nevertheless, rural citizens are more likely to work in non-agricultural sectors that cannot provide long-term employment contracts and they are less likely to be covered by the social welfare system (Cai, Park and Zhao, 2008; Park and Cai, 2011; Rickne, 2013). Therefore, rural citizens who sign land rental contracts conditioned on their non-agricultural incomes might need to violate rental contracts ex-post when they experience unanticipated non-agricultural employment failure, inducing a new type of uncertainty that affects agents who have entered the market.

As the most consequential ex-post maladaptation in China's rural land rental market, however, uncertainty involving ex-post contract violations rarely results in costly ex-post renegotiations, which seems contradictory to transaction-cost theory (Williamson, 2000). The market is inundated with informal contracts. Rental partners are wary of the potential for termination of rental contracts before agreed-upon tenures have expired. Before the 2010s, the percentage of informal contracts in any given year often rose above 80% (Jin and Deininger, 2009; Tian and Fang, 2013). According to Yang (2020), about 50% of rental contracts remained informal according to a 2014 survey. Hence, if ex-post adaptation costs are not involved, what transaction costs are generated by uncertainty associated with ex-post contract violations?

The prevalence of informal land rental contracts, conventionally explained by China's insecure land property rights, social proximity between rental partners, and lack of experience with writing contracts, makes it difficult to understand that contractual formality reflects rental partners' responses to uncertainty. Contractual formality determines contractual enforcement, especially enforcement of compensation paid for contract violations, which affects rental surpluses under uncertainty. Because ex-post contract violations are caused by unanticipated non-agricultural employment failures involving renting-out agents, rental partners exhibit conflicting preferences over contractual formality. Therefore, facing ex-post contract violation uncertainty, rental partners may experience costly ex-ante bargaining over contractual formality, generating ex-ante bargaining costs that smooth ex-post adaptation costs (Williamson, 1991).

Because it has proved difficult to integrate China's separate urban and rural economies within a short time frame (Cheng and Selden, 1994; Wu and Treiman, 2007), the ex-post contract violation uncertainty would exist for a long time in China's rural land rental market, interrupting post-rental agricultural production and distorting agricultural investment incentives (Hart and Moore, 1988). Thus, the ex-ante bargaining costs derived from this uncertainty deserve more attention because they undermine the potential of land rentals to enhance agricultural productivity. In addition, the issue of ex-ante bargaining costs is more serious in the context of China's scattered agricultural landscape. Because household farm size is on average small, a renting-in agent pursuing economy of scale prefers to rent adjacent pieces of land from multiple

rural households. The location of each household's farmland was, however, determined exogenously in the second round of collective land distribution that took place in 1995 (Ho, 2001). Thus, because of the location specificity associated with land, rental partners in bilateral relationships must bargain with agents whose preferences for contractual formality conflict, and there are few alternatives.

To fill in the blanks in the literature and sweep away obstacles to further market development, in this study I open the black box of transaction costs in China's rural land rental market in the 2010s. I develop a reduced-form three-step approach to estimate the ex-ante bargaining costs I observe. First, I examine why rental partners' preferences for contractual formality conflict. These preferences differ because shocks to renting-out agents' non-agricultural income exacerbate the uncertainty associated with ex-post contract violations. The difference in preferences is further aggravated by location specificity. Second, I test the bargaining mechanism in the context of conflicting preferences. Facing conflicting preferences, efficient bargaining facilitated by monetary transfers maximizes joint benefits so that the agent in a given transaction who faces lower compromise costs is more likely to compromise. Third, I compute the ex-ante bargaining costs. In inefficient bargaining when the agent who incurs lower compromise costs refuses to compromise, extra ex-ante bargaining costs reflected in rental payments that are separate from monetary transfers are generated. Using data collected using a transactional-oriented sampling strategy in Yang (2020), I support my three-step theory and measure the monetary value of these ex-ante bargaining costs. I find that 18% of rental transactions experience inefficient bargaining. Renting-out agents' refusal to compromise generates average ex-ante bargaining costs of around 126.5 RMB per mu per year. These ex-ante bargaining costs paid by renting-out agents force renting-in agents to compromise by accepting informal contracts. Renting-in agents' refusal to compromise generates average ex-ante bargaining costs of around 35.42 RMB per mu per year paid by the renting-in agents.

This paper represents an important extension of Yang (2020). Yang (2020) focuses on explaining multiple contractual terms by direct reference to important rental attributes that include ex-post contract violation uncertainty and location specificity regarding land. The theory proposed and tested in Yang (2020) shows implicitly that rental partners who respond differently to uncertainty and location specificity jointly affect bargaining outcomes in opposite directions. The study's empirical analysis, however, does not explicitly show why rental partners' preferences differ or how conflicting preferences affect the bargaining mechanism. This paper, taking advantage of data indicating matched rental partners' preferences regarding contractual formality, uses ex-post contract violation uncertainty and location specificity to explain the conflicting preferences, providing an opportunity to reveal the bargaining process and measure the transaction costs generated during this process. To the best of my knowledge, the literature on rural land rental markets in developing countries has not estimated the monetary value of such transaction costs. My measure of ex-ante bargaining costs verifies the existence of the rumored transaction costs in this market and indicates the extent to which these transaction costs affect future market development.

In addition to providing the first monetary measure designed to estimate transaction costs in China's rural land rental market, my approach also contributes, from three perspectives, to the literature on adapta-

tion costs (Williamson, 1971; Crocker and Reynolds, 1993; Bajara and Tadelis, 2001; Bajara, Houghton and Tadelis, 2014; Chakravarty and MacLeod, 2009). First, merging transaction-cost theory with contract theory (Williamson, 2010; Grossman and Hart, 1986; Hart and Moore, 1988), I am able to measure ex-ante bargaining costs to show that transaction costs are created ex-ante to smooth ex-post adaptation costs. Therefore, merely measuring ex-post adaptation costs would make it difficult to avoid underestimating the total transaction costs associated with uncertainty (Crocker and Reynolds, 1993; Bajara, Houghton and Tadelis, 2014). Second, while Bajara, Houghton and Tadelis (2014) develop a structural approach to estimate adaptation costs in procurement auctions, I develop a reduced-form method to estimate transaction costs that could be applied to industries in which negotiations are used more frequently than auctions (Bajari, McMillan and Tadelis, 2009). Third, my three-step model that reveals the bargaining process in the context of conflicting preferences potentially explains the empirical contradictions associated with the relationship between uncertainty and contractual arrangements (Leiblein, 2003; Levy, 1985; Harrigan, 1986; Sutcliffe and Zaheer., 1998). My theory shows that, facing opposite responses to uncertainty, the relationship between uncertainty and a given contractual arrangement is at least partially determined by the bargaining process rather than fully validating the theoretical prediction, resulting in inconsistent empirical contributions in the literature.

The remainder of the paper is organized as follows. In Section 1, I introduce the institutions and features associated with bargaining over China's mature land rental contracts. In Section 2 I model the process that generates ex-ante bargaining costs theoretically, based on the formation of individual contractual formality preferences and bargaining between rental partners. Section 3 introduces the survey data as well as the empirical measurements or proxies for the exogenous parameters. In Section 4 I present the empirical analysis that measures ex-ante bargaining within the theoretical framework. Section 5 concludes with a discussion of policy implications for China.

1 Theoretical Considerations

In this theoretical section, I capture the essential nature of bargaining over contractual formality in China's mature rural land rental market. Yang (2020) introduces China's mature land rental markets to the literature, highlighting three institutional features of such markets that also apply more generally to bargaining over contractual formality.

First, to achieve economy of scale in post-rental agricultural production, renting-in agents collect plots from multiple renting-out agents whose household farms are adjacent to each other. Therefore, because of location specificity in the context of scattered agricultural landholdings, rental partners who are bilaterally bound are not able to match endogenously based on preferences for contractual arrangements. Second, mature markets that feature high participation rates are embedded in areas with comparatively secure land property rights. Therefore, rental partners who are bargaining over contractual arrangements have considerable decision-making power that enables them to prevent village administrations from assuming full control. Third, in this context ex-post contract violation uncertainty becomes more important for explaining

contractual formality. Along with strengthened land property rights (Gao, Huang and Rozelle, 2012; Wang, Riedinger and Jin, 2015), neither the high costs of writing contracts nor social proximity between rental partners explains why around 50% of rental contracts remain informal nationwide (Zhang, 2016). Township agricultural bureaus increasingly distribute free rental-contract templates to villages in their administrative regions, reducing costs involved in writing formal contracts. Using transactional-level data that properly represent the distribution of rental attributes, Yang (2020) shows that non-strangers are more likely than strangers to sign formal contracts.

In consideration of the three abovementioned institutional features of bargaining over contractual formality, I model the final arrangement of contractual formality as bargaining outcomes between rental partners who may harbor conflicting preferences. Holding opposite individual preferences, one agent may have to give up his/her individual preference to facilitate the completion of a rental transaction. Efficient bargaining maximizes the joint rental surplus under ex-post contract violation uncertainty, while inefficient bargaining generates ex-ante bargaining costs. In this section I model, in three steps, the generation of transaction costs associated with ex-ante bargaining over contractual flexibility. The theoretical framework covers the formation of rental partners' individual preferences regarding contractual formality, the compromise mechanism that determines the final arrangement of contractual formality, and the generation of ex-ante bargaining costs.

1.1 Individual Preferences for Contractual Formality

Determining how compensation for contract violations is enforced, the degree of formality characterizing a contract affects rental partners' expected rental profits under ex-post contract violation uncertainty. Shocks to renting-out agents' non-agricultural income is the root of ex-post contract violation uncertainty, affecting both rental partners' expected rental profits and thus their preferences for contractual formality. In addition, under ex-post contract violation uncertainty, varying degrees of location specificity associated with violators' land affect renting-in agents' post-rental agricultural production differently, influencing renting-in agents' preferences regarding contractual formality. In this subsection, I model the optimal contractual formality for renting-out agents and renting-in agents, respectively.

1.1.1 Renting-out Agents' Optimal Contractual Formality

Suppose that a renting-out agent (superscripted by o) has land endowment L , which was distributed in 1995 by the collective community. Without loss of generality, I assume that a renting-out agent either rents out his/her entire land endowment or does not participate in the rural land rental market (Yang and Wen, 2020). The renting-out agent's annual profit from agricultural production is $(w_a^o(L))$, which is increasing and concave with L .

A renting-out agent earns expected annual non-agricultural income w_e . He/she decides whether to rent land out based on whether w_e is greater than his/her annual agricultural profit $(w_a^o(L))$. Without loss of generality, if $w_e > w_a^o(L)$, the renting-out agent rents out the entire land endowment L to a renting-in partner

and signs a two-year rental contract with contractual formality C . This two-year fixed-tenure model could become a two-period model without changing the theoretical essentials. Contractual formality C ranges between 0 and 1, where “0” represents an entirely informal contract and “1” represents an entirely formal contract. The costs for writing a rental contract with contractual formality C is $G(C)$, which is shared equally between rental partners (Hart and Moore, 1988). The writing cost is increasing and convex with C . The annual rental payment is r per mu. I assume that $w_a^o(L) \leq rL$ because rental payments reflect only the value of land in agricultural production.

In the first year of the two-year rental contract, the renting-out agent receives rental payment (rL) and shifts to the non-agricultural sector. At the end of the first year, the renting-out agent realizes his/her actual non-agricultural income, $w_e - s$, where s denotes the unanticipated shock to non-agricultural incomes caused by China’s separated urban–rural social structure. Because of the potential that a non-agricultural income shock can occur, in the second year the renting-out agent may readjust his/her labor allocation between the agricultural and non-agricultural sectors, which may lead him/her to violate the previously signed rental contract.

In the second year of the contract, if the renting-out agent violates the contract he/she pays violation compensation (N) based on the strictness of the legal enforcement of the rental contract. The strictness of legal enforcement ($E(\cdot)$) increases with C , interpreted as the probability of implementation, on a scale ranging between 0 and 1. Because $E(\cdot)$ is associated with the violation compensation paid by the renting-out agent to the renting-in agent, it has to be both a concave and a convex function. Hence, I assume that $E(\cdot)$ increases at a constant rate with C ($E_{CC} = 0$). The violation compensation N is determined exogenously by village institutions. In violating the contract, the renting-out agent reallocates labor from the non-agricultural sector back to agricultural production at an extra transiting cost of δ . If the renting-out agent maintains the rental contract, he/she receives the second-year rental payments rL and his/her non-agricultural income is $w_e - s$.

Therefore, in the second year of the contract, the renting-out agent ex-post adapts the rental contract by balancing the expected benefits associated with maintaining or violating the contract. The expected benefit of violating the contract is $w_a^o(L) - E(C)N - \delta$. The expected benefit of maintaining the contract is $rL + w_e - s$. Hence, the probability that the renting-out agent maintains the rental contract in the second year ($\rho(\cdot)$) increases with K , where

$$K = rL + w_e - s - [w_a^o(L) - E(C)N - \delta].$$

Because $1 - \rho(K)$ is associated with both the renting-out agent’s expected violation cost and the expected compensation received by the renting-in agent, $\rho(K)$ has to be both a concave and a convex function. Hence, I assume that $\rho(\cdot)$ increases with K at a constant rate ($\rho_{KK} = 0$).

The renting-out agent maximizes his/her expected profits associated with the two-year rental contract ($H^o(\cdot)$) by choosing his/her optimal contractual formality C^{o*} . The renting-out agent’s expected profits from the rental contract, $H^o(\cdot)$, includes the pre-paid first-year rent (rL), the first-year non-agricultural income

(w_e), and the expected profits in the second year less half of the contract-writing cost ($\frac{G(C^o)}{2}$). In the second year, at probability $\rho(K)$, the renting-out agent maintains the contract, receiving the rent and non-agricultural income with a shock, $rL + w_e - s$. At probability $1 - \rho(K)$, the renting-out agent terminates the contract, paying the violation compensation according to the contract's legal enforcement mechanism ($E(C^o)N$) and profiting from re-starting agricultural production ($w_a^o(L)$) less the cost of transiting between sectors (δ). Thus, $H^o(\cdot)$ is the following:

$$\max_{C^o} H^o(C^o) = rL + w_e + \rho(K)[rL + w_e - s] + (1 - \rho(K))[-E(C^o)N - \delta + w_a^o(L)] - \frac{G(C^o)}{2}$$

The first-order condition that characterizes the renting-out's optimal contractual formality (C^{o*}) is the following:

$$\rho_K E_{C^o} N [rL + w_e - s] - (1 - \rho(K)) E_{C^o} N - \rho_K E_{C^o} N [-E(C^o)N - \delta + w_a^o(L)] - \frac{G_{C^o}}{2} = 0$$

The marginal benefits of C^o come mainly from the incremental increase in the probability of maintaining the rental contract (ρ_K). As C^o increases, the renting-out agent is less likely to violate the rental contract, which increases his/her expected profits from rental payments and non-agricultural income. The marginal cost of contractual formality C^o is divided into three components. The first component is the extra expected violation compensation paid by the renting-out agent as a result of the incremental legal enforcement, $(1 - \rho(K))E_{C^o}N$. The second component reflects the fact that, as the probability of maintaining the rental contract rises, the expected profits associated with violating the contract fall. The third component is the shared marginal contract-writing cost. The first-order condition shows that the renting-out agents' optimal contractual formality C^{o*} equalizes the marginal benefits and the marginal costs.

I make ASSUMPTION 1 to ensure that the second-order condition can be satisfied.

$$\text{ASSUMPTION 1: } \frac{G_{C^o C^o}}{2} > 2\rho_K (E_{C^o} N)^2$$

The comparative statics show how important parameters affect the renting-out agent's optimal contractual formality C^{o*} . My theory focuses on explaining how non-agricultural income shocks affect market participants' individual contractual-formality preferences. Based on ASSUMPTION 1, because the non-agricultural income shock reduces the probability that the renting-out agent maintains the rental contract, the renting-out agent's optimal contractual formality declines (see Eq. 1).

$$\frac{\partial C^{o*}}{\partial s} = \frac{2\rho_K E_{C^o} N}{2\rho_K (E_{C^o} N)^2 - \frac{G_{C^o C^o}}{2}} < 0 \quad (1)$$

1.1.2 Renting-in Agents' Optimal Contractual Formality

A renting-in agent (superscripted by *in*) plans to rent $\bar{L}$ units of adjacent land and $\bar{L} \geq L$. The renting-in agent collects the $\bar{L}$ units of adjacent land from multiple renting-out partners and profits from agricultural production ($w_a^{in}(\bar{L})$); the profit is increasing and concave with $\bar{L}$. For a two-year rental contract signed with one renting-out agent with land endowment L accompanied by contractual formality C , the renting-in agent prepays the first-year rent (rL) and obtains the agricultural profits generated by this piece of land based on the ratio of L to $\bar{L}$, which is $w_a^{in}(\bar{L}) \frac{L}{\bar{L}}$.

The renting-in agent shares the writing cost $G(C)$ with his/her renting-out partner. As is the case with land property rights security, the security of the rental that is established by greater contractual formality could positively affect $w_a^{in}(\cdot)$ (Besley, 1995). Given the comparatively low violation compensation N ,¹ however, the renting-in agent has a strong incentive to avoid a low degree of contractual formality regardless of the positive marginal effects of C on $w_a^{in}(\cdot)$. Thus, assuming that $w_a^{in}(\cdot)$ is not affected by C simplifies the mathematics without affecting the theoretical essentials.

In the second year of the contract, unanticipated shocks associated with the renting-out agent's non-agricultural income may induce the renting-out agent to terminate his/her rental contract. Hence, in the second year, at probability $\rho(K)$, the renting-out agent maintains the contract so that the renting-in agent pays the second-year rent rL and obtains agricultural profit $w_a^{in}(\bar{L}) \frac{L}{\bar{L}}$. At probability $1 - \rho(K)$, the renting-out agent terminates the contract. In that circumstance, the renting-in agent receives compensation from the renting-out agent based on $E(C)$ and experiences a loss in agricultural profits resulting from the loss of the violator's land.

The loss in agricultural profits caused by the contract violation is $w_a^{in}(\bar{L}) - w_a^{in}(\bar{L}(1 - (1 + \alpha) \frac{L}{\bar{L}}))$, where $(1 + \alpha) \frac{L}{\bar{L}}$ represents the location specificity of a given piece of land L . Facing violation uncertainty, a piece of land with greater location specificity not only causes a potential loss in agricultural production on this piece of land but also an additional loss associated with a general decrease in agricultural productivity on other pieces of land that are part of $\bar{L}$. The abstraction of location specificity entails two factors: location importance and scale importance.

First, α , scaled between 0 and 1, captures location importance. A piece of land L that is located closer to the middle of an adjacent piece of land $\bar{L}$ has greater location importance, reflected by a higher α , because losing that piece of land would affect the feasibility of applying mechanization to make the land more productive. On the other hand, a piece of land L located along the boundary of the adjacent land $\bar{L}$ could be excluded without incurring substantial extra costs from the use of mechanized agriculture. Second, $\frac{L}{\bar{L}}$ captures the scale importance. The greater the percentage of the land L occupies, the more important is this piece of land from the perspective of scale. Thus, $(1 + \alpha) \frac{L}{\bar{L}}$, the location specificity, captures the degree to which the renting-out agent's land L could affect the renting-in agent's general productivity. Therefore, $\bar{L}(1 - (1 + \alpha) \frac{L}{\bar{L}})$ denoted as L_v represents the effective farming scale net of the violator's land.

¹Local governments protect renting-out agents' benefits by institutionally setting violation compensation at low levels.

The renting-in agent's optimal contractual formality (C^{in*}) maximizes his/her expected profits under a two-year rental contract ($H^{in}(\cdot)$). For a single contract, in the first year the renting-in agent pre-pays the rent (rL) and obtains his/her agricultural profits ($w_a^{in}(\bar{L})\frac{L}{\bar{L}}$). In the second year, at probability $\rho(K^o)$, the contract is maintained, and so are the expected profits. At probability $1 - \rho(K^o)$, the contract is terminated so that the renting-in agent is compensated by the renting-out agent according to $E(C^{in})N$ and experiences a loss in agricultural profits ($w_a^{in}(\bar{L}) - w_a^{in}(\bar{L} - (1 + \alpha)L)$). Thus, $H^{in}(\cdot)$ is the following:

$$\begin{aligned} \max_{C^{in}} H^{in}(C^{in}) &= -rL + w_a^{in}(\bar{L})\frac{L}{\bar{L}} + \rho(K)(-rL + w_a^{in}(\bar{L})\frac{L}{\bar{L}}) \\ &+ (1 - \rho(K))\{E(C^{in})N - w_a^{in}(\bar{L}) + w_a^{in}(\bar{L}(1 - (1 + \alpha)\frac{L}{\bar{L}}))\} - \frac{G(C^{in})}{2} \end{aligned}$$

The first-order condition that characterizes the renting-in agent's optimal contractual formality (C^{in*}) is the following:

$$\rho_K E_{C^{in}} N (-rL + w_a^{in}(\bar{L})\frac{L}{\bar{L}}) + (1 - \rho(K)) E_{C^{in}} N - \rho_K E_{C^o} N \{E(C^{in})N - w_a^{in}(\bar{L}) + w_a^{in}(\bar{L}(1 - (1 + \alpha)\frac{L}{\bar{L}}))\} - \frac{G_{C^{in}}}{2} = 0$$

The marginal benefits of C^{in} comprise two components. As contractual formality increases, the renting-in agent's expected profits from maintaining the contract increase as well. Meanwhile, as C^{in} increases, the renting-in agent is better protected when a violation occurs because the violation compensation is more likely to be paid. The marginal costs of C^{in} also comprise two components. As C^{in} increases, the probability of maintaining the rental contract rises, reducing the renting-in agent's expected profits associated with the renting-out agent's contract violation. Moreover, the renting-in agent shares the marginal contract-writing cost associated with higher C^{in*} . The renting-in agent's optimal contractual formality C^{in*} equalizes the marginal benefits and the marginal costs.

Because the second-order condition is satisfied, the comparative statics show that, as the renting-out agent's non-agricultural income shock rises, the renting-in agent prefers greater contractual formality to protect his/her expected profits when facing the uncertainty associated with the renting-out agent's contract violation (see Eq. 2). A comparison of the comparative statics $\frac{\partial C^{o*}}{\partial s}$ with $\frac{\partial C^{in*}}{\partial s}$ (Eqs. 1 and 2) yields the first proposition:

$$\frac{\partial C^{in*}}{\partial s} = \frac{\rho_K E_{C^{in*}} N}{2\rho_K E_{C^{in*}} N + \frac{G_{C^{in*}}}{2}} > 0 \quad (2)$$

The comparison between the comparative statics $\frac{\partial C^{o*}}{\partial s}$ and $\frac{\partial C^{in*}}{\partial s}$ (Eqs. 1 and 2) yields the first proposition.

PROPOSITION 1: *Because it increases the uncertainty of ex-post contract violation uncertainty, the amplified non-agricultural income shock the renting-out agent experiences decreases the renting-out agent's optimal level of contractual formality but it increases the renting-in agent's optimal level of contractual formality.*

The impact of location specificity on the renting-in agent's optimal contractual formality is reflected in the comparative statics associated with location importance α and scale importance $\frac{L}{\bar{L}}$.

$$\begin{aligned}\frac{\partial C^{in*}}{\partial \alpha} &= \frac{\rho_K E_{C^{in*}} N w_a^{in} L_v L}{2\rho_K E_{C^{in*}} N + \frac{G_{C^{in}C^{in}}}{2}} > 0 \\ \frac{\partial C^{in*}}{\partial L} &= \frac{\rho_K E_{C^{in*}} N (w_a^{in}(\bar{L})/\bar{L} + w_a^{in} L_v (1 + \alpha))}{2\rho_K E_{C^{in*}} N + \frac{G_{C^{in}C^{in}}}{2}} > 0 \\ \frac{\partial C^{in*}}{\partial \bar{L}} &= \frac{-\rho_K E_{C^{in*}} N (w_a^{in} \bar{L} / \bar{L}^2) + w_a^{in} \bar{L} - w_a^{in} L_v (1 + \alpha)}{2\rho_K E_{C^{in*}} N + \frac{G_{C^{in}C^{in}}}{2}} < 0\end{aligned}$$

According to the above comparative statics, both location importance α and scale importance $\frac{L}{\bar{L}}$ positively affect C^{in*} . Because greater location specificity increases the loss in general agricultural productivity that might occur, a higher C^{in*} better protects the renting-in agent's expected profits under violation uncertainty. This gives rise to PROPOSITION 2:

PROPOSITION 2: *As location specificity increases (either location importance or scale importance), the renting-in agent's optimal level of contractual formality increases to protect his/her expected profits when a contract violation occurs.*

1.2 Bargaining over Contractual Formality

The considerations discussed in the previous subsection show that non-agricultural income shocks induced by China's dual urban–rural social structure and location specificity cause rental partners to form conflicting preferences for contractual formality. When contemplating the possibility that C^{o*} and C^{in*} will differ significantly, rental partners bargain cooperatively to achieve the maximum joint surplus by choosing the final extent of contractual formality $\tilde{C}$. To bring the compromise mechanism between rental partners with conflicting preferences into sharp focus for my analysis, I assume, without loss of generality, that the final arrangement of contractual formality is either C^{o*} or C^{in*} , where $\tilde{C} \in \{C^{o*}, C^{in*}\}$.

Bargaining over contractual formality in the context of uncertainty regarding ex-post contract violations could lead to failed transactions. The ex-ante bargaining costs associated with failed bargaining are converted into market-entry transaction costs. The transaction costs related to failed transactions, however, are trivial compared with those related to eventful transactions. Rental partners who are willing to enter the market have incentives to let transactions occur rather than exiting the market because of unsuccessful bargaining over contractual formality. The annual rents for a household farm of fewer than 10 mu are no greater than 5000 RMB, while the minimum wage for most cities in the 2010s was no less than 1000 RMB per month.² It is very likely that rural citizens who are willing to rent their land out have already tapped into sources of non-agricultural income. Hence, renting-out agents are less likely to give up the chance to earn

²CEIC Data, <https://www.ceicdata.com/zh-hans/china/standard-of-monthly-minimum-wage>.

non-agricultural income that is often double the rent because of bargaining conflicts. For their part, renting-in agents face the location-specificity problem. Therefore, they cannot easily give up one renting-out agent just because of intensive bargaining without risking the loss of an opportunity to obtain an adjacent piece of land for post-rental agricultural production.

To capture the essential point that the primary transaction costs generated by ex-post contract violations are the ex-ante bargaining costs involved in completing successful rental transactions between market participants, I assume that both renting-out agents and renting-in agents enjoy greater profits from a rental contract that lacks any degree of contractual formality than any profits earned following a bargaining failure. Thus, I make ASSUMPTION 2:

ASSUMPTION 2

$$H^o(.) > 2w_a^o(L) \forall C$$

$$H^{in}(. > 2w_a^{in}(\bar{L}(1 - (1 + \alpha)\frac{L}{\bar{L}})) \forall C$$

If a renting-out agent cannot reach an agreement with the renting-in agent, he/she could continue farming, move into a non-agricultural sector, or work part-time in both sectors. I assume that a renting-out agent remains in agriculture if an agreement is not reached.³ Thus, a renting-out agent's reservation income equals two years of household agricultural profits ($2w_a^o(L)$), while a renting-in agent's reservation income equals two years of profits in agricultural production, excluding the L units of land that belong to the corresponding renting-out partner, which is $2w_a^{in}(1 - (1 + \alpha)\frac{L}{\bar{L}})$. ASSUMPTION 2 rules out the possibility that profits earned from rental transactions featuring a final agreed-upon contractual formality ($\tilde{C}$) are lower than the reservation incomes.⁴

An agent m could be either a renting-out agent or a renting-in agent. At agent m 's optimal contractual formality C^{m*} , he/she could achieve his/her maximized rental profits, $H^m(C^{m*})$. To arrive at an mutually agreeable rental contract, however, agent m may have to compromise with his/her rental partner n to allow $\tilde{C} = C^{n*}$, which imposes a compromise cost on m , $H^m(C^{m*}) - H^m(C^{n*})$, as m relinquishes his/her maximized individual profits.

The compromise mechanism determines whether the renting-out agent's or the renting-in agent's compromise makes it possible to maximize the joint surplus generated by a rental contract in a Nash bargaining framework (Corts and Singh, 2004). Although renting-in agents may enjoy financial advantages over renting-out agents, renting-in agents cannot fully dominate the bargaining (Yang, 2020). To simplify the mathematics, I give rental partners equal bargaining powers. I use $\bar{H}^m$ to denote agent m 's threat point. Hence, the compromise mechanism is derived by comparing the joint surpluses associated with each rental partner's compromise, as shown in Eqs.(3) and (4).

³Agricultural profits and expected non-agricultural wage rates are exogenous, so the source of the renting-out agent's income without rentals does not affect individual optimal contractual formalities.

⁴Relaxing ASSUMPTION 2 affects neither the bargaining mechanism nor the final bargaining outcomes but increases the likelihood of negotiation failure.

$$(H^o(C^{in*}) - \bar{H}^o)^{1/2}(H^{in}(C^{in*}) - \bar{H}^{in})^{1/2} \quad (3)$$

$$(H^o(C^{o*}) - \bar{H}^o)^{1/2}(H^{in}(C^{o*}) - \bar{H}^{in})^{1/2} \quad (4)$$

To facilitate the bargaining process, the compromise mechanism involves a monetary transfer $M^{i,j}$ from i , who does not compromise, to j , who compromises. Therefore, I solve for $M^{o,in}$ and $M^{in,o}$ by rewriting Eqs. (3) and (4) as follows:

$$(H^o(C^{in*}) + M^{in,o} - \bar{H}^o)^{1/2}(H^{in}(C^{in*}) - M^{in,o} - \bar{H}^{in})^{1/2} \quad (5)$$

$$(H^o(C^{o*}) - M^{o,in} - \bar{H}^o)^{1/2}(H^{in}(C^{o*}) + M^{o,in} - \bar{H}^{in})^{1/2} \quad (6)$$

I denote agent m 's compromise cost as $compcost^m = H^m(C^{m*}) - H^m(C^{n*})$. The monetary transfers $M^{o,in}$ and $M^{in,o}$ associated with the two possible bargaining outcomes are the following:

$$M^{in,o} = \frac{1}{2}[H^{in}(C^{in*}) - \bar{H}^{in} - (H^o(C^{o*}) - compcost^o) + \bar{H}^o] \quad (7)$$

$$M^{o,in} = \frac{1}{2}[H^o(C^{o*}) - \bar{H}^o - (H^{in}(C^{in*}) - compcost^{in}) + \bar{H}^{in}]. \quad (8)$$

Taking Eq. (7) as an example, the renting-out agent's final payoff when he/she compromises ($H^o(C^{in*})$), including his/her profits from the rental contract and $M^{in,o}$ transferred from the renting-in agent, is the following:

$$H^o(C^{in*}) = H^o(C^{o*}) - compcost^o + M^{in,o} = \bar{H}^o + \frac{1}{2}[(H^{in}(C^{in*}) - \bar{H}^{in}) + (H^o(C^{o*}) - compcost^o - \bar{H}^o)]$$

When compromising, the renting-out agent's final payoff consists of his/her threat point payoff $\bar{H}^o$ plus half the surplus generated by the threat point with respect to the bargaining outcome C^{in*} . The interpretation of Eq.(8), representing the renting-in agent's final payoff with the renting-in agent's compromise, follows the same logic.

From his/her perspective, the renting-out agent decides whether or not to compromise by comparing his/her profits with and without compromising. If the renting-out agent decides not to compromise, he/she pays $M^{o,in}$ to facilitate the renting-in partner's compromise and realize his/her rental profits at his/her optimal contractual formality C^{o*} . If the renting-out agent decides to compromise, he/she receives payment $M^{in,o}$ from his/her renting-in partner and achieves his/her rental profit at C^{in*} .

$$H^o(C^{o*}) - M^{o,in} - (H^o(C^{in*}) + M^{in,o}) = \frac{1}{2}(compcost^o - compcost^{in}) \quad (9)$$

Thus, as shown in Eq. (9), whether the renting-out agent compromises or not depends on the difference between the rental partners' compromise costs. If the renting-out agent's compromise cost is greater than that of his/her renting-in partner, the renting-out agent pays for the renting-in agent's compromise.

Therefore, the Nash bargaining framework ensures that the party incurring the lower compromise cost is the one who makes compromises, which maximizes the joint surplus that both rental partners enjoy (Corts and Singh, 2004).

From the renting-in agent's perspective, I arrive at the same compromise mechanism according to which, as shown in Eq. (10), the renting-in agent compromises if $compcost^{in}$ is lower than $compcost^o$.

$$H^{in}(C^{in*}) - M^{in,o} - (H^{in}(C^{o*}) + M^{o,in}) = \frac{1}{2}(compcost^{in} - compcost^o). \quad (10)$$

Hence, Eqs. (9) and (10) consistently yield PROPOSITION 3, which describes the compromise mechanism:

PROPOSITION 3: *The party facing the higher compromise cost is less likely to compromise, which maximizes the joint surplus from rentals.*

1.3 Ex-ante Bargaining Costs

PROPOSITION 3 demonstrates the compromise mechanism that drives efficiency in bargaining, theoretically predicting the agent who should compromise. In the previous subsection, we saw that either the renting-in agent or the renting-out agent must compromise in the face of conflicting preferences. Without loss of generality, $COMP^{in*} = 1$ denotes the situation in which the renting-in agent is the compromising agent based on the theory. $COMP^{in*} = 0$ denotes the situation in which the renting-out agent is the theoretically predicted compromising agent. Similarly, $COMP^{in}$ denotes the actual agent who compromises in the bargaining. $COMP^{in} = 1$ represents the situation in which the renting-in agent actually compromises. $COMP^{in} = 0$ represents the situation in which the actual compromising agent is the renting-out agent. Efficient bargaining occurs when the theoretically predicted compromising agents are the actual compromising agents, that is, $COMP^{in*} = COMP^{in}$. In inefficient bargaining, the agent facing the lower compromise cost refuses to compromise. Therefore, inefficient bargaining occurs when the theoretical compromising strategies do not match the actual compromising decisions, that is, $COMP^{in*} \neq COMP^{in}$.

Based on the theoretical framework presented in Subsection 1.2, the transfer of money ($M^{n,m}$) facilitates efficient bargaining such that the final degree of contractual formality maximizes the rental partners' joint profits without generating transaction costs. The monetary transfers are reflected in rental payments. Efficient bargaining occurs in either of two scenarios. If $COMP^{in*} = COMP^{in} = 1$, a monetary transfer flows from the renting-out agent to the renting-in agent, resulting in a transactional price ($r^{COMP^{in*}=COMP^{in}=1}$) that equals the market price (r^*) less the monetary transfer ($M^{o,in}$). If $COMP^{in*} = COMP^{in} = 0$, the transactional price including the monetary transfer results in rent ($r^{COMP^{in*}=COMP^{in}=0}$) that equals $r^* + M^{in,o}$.

The transaction costs generated by inefficient bargaining are reflected in rents that cannot be explained by the monetary transfers. Inefficient bargaining occurs in either of two scenarios. The first scenario involves the renting-out agents' refusal to compromise ($COMP^{in*} = 0$ & $COMP^{in} = 1$). Because the theory predicts that renting-out agents should compromise, the renting-out agents should receive $M^{in,o}$ from the renting-in

agents. To persuade the renting-in agents to compromise at the expense of the joint surplus, the renting-out agents must pay extra transaction costs to the renting-in agents (TC^{01}). Hence, the transactional price at $COMP^{in*} = 0$ & $COMP^{in} = 1$ is $r^* + M^{in,o} - TC^{01}$. Similarly, in the scenario in which renting-in agents refuse to compromise ($COMP^{in*} = 1$ & $COMP^{in} = 0$), transactional prices include the monetary transfers $M^{o,in}$ paid by renting-out agents and the ex-ante bargaining costs TC^{10} paid by renting-in agents. Table 1 lists the transactional prices for all of the efficient and inefficient bargaining scenarios that might occur. PROPOSITION 4 captures the ex-ante bargaining costs in the two scenarios:

Table 1: Transactional Prices and Bargaining

$COMP^{in*}$	$COMP^{in}$	Transactional Prices
0	0	$r^* + M^{in,o}$
1	1	$r^* - M^{o,in}$
0	1	$r^* + M^{in,o} - TC^{01}$
1	0	$r^* - M^{o,in} + TC^{10}$

PROPOSITION 4: *The ex-ante bargaining cost (TC) is the difference in rent caused by the difference between efficient and inefficient bargaining while controlling for the same theoretically predicted compromising agent.*

Inefficient bargaining in which the agent who incurs a higher compromise cost mistakenly compromises in the bargaining creates ex-ante bargaining costs. Such ex-ante bargaining costs, however, reveal the rental partners' precaution regarding ex-post adaptation uncertainty. In inefficient bargaining, the agent who stands to benefit from a lower compromise cost refuses to compromise because he/she has private information indicating that his/her compromise with respect to contractual formality would lead to a high ex-post adaptation cost that he/she would find it difficult to bear. Therefore, inefficient bargaining provides a precautionary strategy that generates ex-ante bargaining costs while smoothing the ex-post adaptation costs. The measure of ex-ante bargaining costs implied by PROPOSITION 4 indicate that measuring only the ex-post adaptation costs would result in underestimation of the transaction costs.

2 Data and Empirical Measurements

The data I use for the following empirical analysis is a subsample of the data used in Yang (2020). Details regarding the survey through which the data were collected, including the survey locations, selected survey questions, sampling strategies, the survey administration process, and summary statistics can be found in Yang (2020). In Section 2.1 I demonstrate how the sampling strategy deployed in Yang (2020) determines the matching rate between rental partners in the data and the relationship between the subsample of matched rental partners used in this paper and the full sample used in Yang (2020). In Section 2.2 I introduce the empirical measures of the variables and parameters in the conceptual framework.

2.1 Data

For the purposes of this analysis, especially to measure the ex-ante bargaining costs derived from interaction between rental partners, it is essential to use data on rental transactions that provide information regarding matched renting-in agents and the renting-out agent. Designing a transaction-oriented sampling strategy, Yang (2020) collects the first transactional data in China's rural land rental market, covering 332 land rental transactions in 13 villages in 2 provinces. This transaction-oriented sampling strategy not only avoids problems involved in using conventional rural household surveys to conduct transactional-level research on China's rural land rental market, but it also improves the rate at which rental partners are matched in the dataset.

The three-step transaction-oriented sampling strategy deployed in Yang (2020) makes it easier to match rental partners associated with larger renting-in scales. First, this strategy makes it possible to survey all the important renting-in agents with high market shares and randomly selects the remaining renting-in agents seeking small-scale rentals if they jointly represent a significant market share. Second, the strategy involves constructing renting-out cohorts based on their corresponding renting-in agents. Each important renting-in agent has his/her own renting-out cohort. The small-scale renting-in agents share a renting-out cohort as a group. Third, this strategy involves random selection of renting-out agents from each renting-out cohort based on their corresponding renting-in agents' (or group's) market share. Thus, this sampling strategy almost guarantees the matching of rental partners associated with larger renting-in scales.

It is almost impossible to match rental partners in rural household surveys because very few market participants in each village market can be interviewed. Applying the transaction-oriented sampling strategy described above, I successfully match rental partners in 141 of 332 rental contracts, reaching a matching rate of 43.4% and covering more than 50% of the rented land in each selected village. These 141 rental contracts, which I label the "subsample," constitute the subsample used in this paper. Summary statistics are reported in Table 2.

The results reported in Table 3 show that the 141 rental contracts that comprise the subsample are located in nine villages. Compared with those included in the full sample, four villages are missing from the subsample. The transaction-oriented sampling strategy sketches the village market structure by grouping the renting-in agents who represent a low market share and constructing a shared renting-out cohort for them, reducing the possibility of matching between rentals associated with small renting-in scales. The rental markets in the four missing villages are less concentrated, with very few important renting-in agents who each occupy high market shares.

Hence, the 141 rental contracts with matched rental partners represent the bargaining process and contractual arrangements for rentals associated with larger renting-in scales. Using the results reported in Table 4 we can compare the renting-in scales of the full sample and the subsample. The 332 rental contracts in the full sample are associated with 62 renting-in agents. Those in the subsample are associated with the 17 renting-in agents with high market shares. The average renting-in scale and the average scale of the corresponding renting-out cohort are much larger in the subsample than in the full sample.

Table 2: Summary Statistics of 141 Rental Contracts with Matched Rental Partners

Variables	Definition	Mean	Std.Dev.
Contractual Terms			
C^{o*}	The renting-out agents' formality proposal (1=Formal Contract; 0=Informal Contracts)	0.284	0.452
C^{in*}	The renting-in agents' formality proposals(1=Formal Contract; 0=Informal Contracts)	0.844	0.364
$\tilde{C}$	Contractual formality (1=Formal Contract, 0=Informal Contract)	0.624	0.486
RENTS	Rental payment per mu (RMB)	470.369	115.560
Non-Agricultural Income Shocks and Location Specificity			
LONG NON-AGRI	The family member of the renting-out household who contributes the most value to family finances has a long-term non-agricultural employment contract (1=Long-term Contract, 0=Short-term/Temporary Contract)	0.596	0.492
BORDER	Renting-out agent's household farmland is sited along the border of an adjacent piece of land (1=Close, 0=Not Close)	0.447	0.500
$SCALE^o$	The size of renting-out agents' household farmland (mu).	6.805	3.372
$SCALE^{in}$	The renting-in scale associate with each renting-out agents' corresponding renting-in agents (mu).	2756.128	1418.51
The Pattern of Bargaining and the Relationship between Rental Partners			
DIRCT COMM	The initial negotiations between the renting-in and renting-out agents involve direct communication between the rental partners without the involvement of a third party (1=Direct Communication, 0=Third Party)	0.312	0.465
ENTERPRISE	The renting-in agent participates in the rural land rental market as a registered enterprise (1=Enterprise, 0=Individual)	0.652	0.478
NON STRANGER	The renting-in and renting-out agents are non-strangers, i.e. relatives or villagers. (1=Non-strangers, 0=Strangers)	0.610	0.490
AGGR VILL TRUST	The fraction of villagers who trust non-strangers (i.e. relatives and villagers) more than strangers in land rental issues in a village (leave-one-out strategy) $\times 100$	18.187	10.904
AFTER 2006	Whether the rental transactions was signed after 2006 (1=Yes; 0=No)	0.766	0.425

Table 3: The Full Sample and the Subsample

	No. Obs	No. Towns	No. Villages
Full Sample in Yang (2020)	332	5	13
Subsample : Matched Rental Partners	141	5	9

Table 4: Renting-in Scales and Renting-out Cohorts across Samples

	No. Renting-in Agents	Avg. Renting-in Scale (mu)	Avg. Scale of Renting-out Cohorts
Full Sample in Yang (2020)	62	622.56	76.84
Subsample	17	1508.71	104.08

On the one hand, in rentals associated with larger renting-in scales, rental partners are more likely to be exogenously matched according to the locations of renting-out agents' land plots. On the other hand, rental partners are more likely to be constrained bilaterally by location specificity. As the degree of location specificity increases, the need to consider ex-post adaptation under uncertainty increases as well (Williamson, 2000). Therefore, transaction costs generated by ex-post contract violation uncertainty pose a more serious problem for rentals associated with larger renting-in scales. The comparisons of contractual arrangements across samples with varying degrees of location specificity suggest how that argument might run.

The results reported in Table 5 show that a higher degree of location specificity in the subsample of 141 contracts results in significant differences in the percentages of formal contracts between the two samples, whereas the rents are not significantly different. These comparisons indicate that location specificity could affect contractual arrangements in response to uncertainty regarding ex-post contract violations, which would affect the transaction costs generated by that uncertainty. Because of the feasibility of upgrading production technology and gaining profits from economies of scale, rentals associated with larger renting-in scales shed light on the future development of China's mature rural land rental market. Investigating the transaction costs associated with larger renting-in scales could further eliminate obstacles to market expansion.

Table 5: Contractual Arrangements across Samples

		No. Obs	Mean	Std.Err.	Diff P Value
Rents	Full Sample excluding Subsample	191	457.477	15.088	0.553
	Subsample	141	470.369	8.995	
$\tilde{C}$	Full Sample excluding Subsample	191	0.471	0.036	0.006
	Subsample	141	0.624	0.041	

2.2 Empirical Measurements

In this subsection, I introduce the empirical measures for three types of variables. I first elaborate on the measures related to the bargaining process and the associated outcomes, highlighting features involved in bargaining over contractual formality in China's mature rural land rental market. I then introduce important explanatory variables used in testing PROPOSITIONS 1–4, mainly the variables that represent non-agricultural income shocks and location specificity. In the end, I introduce additional control variables that represent important rental attributes, creating an overall picture of larger renting-in scale rentals in China's rural land rental markets in the 2010s.

2.2.1 The Bargaining Process and the Associated Outcomes

It is a great advantage that the 141 contracts with matched rental partners reveal the entire bargaining process, leaving room to study the bargaining mechanism. The bargaining process begins with proposals re-

garding contractual formality based on individual preferences. The measures of individual preferences for contractual formality (C^{O*} and C^{in*}) are derived from answers to the survey question, “*What was the degree of contractual formality you proposed in the initial negotiation, formal or informal?*” Among the 141 contracts containing information on both rental partners, 28.4% of the renting-out agents and 84.4% of the renting-in agents proposed formal contracts in initial negotiations. These statistics indicate that renting-in agents’ preference for contractual formality is much stronger than that of renting-out agents.

The bargaining outcomes consist of the final degrees of contractual formality ($\tilde{C}$). Among the 141 rental contracts in the subsample, 62.4% end up as formal contracts. This percentage is significantly higher than that among the 191 rentals associated with smaller renting-in scales. In Table 6 I report the four possible combinations of rental partners’ preferences and the corresponding bargaining outcomes, revealing two features of bargaining over contractual formality. First, except for four pairs of rental partners, the renting-out agents’ preference for contractual formality is no weaker than that of their corresponding renting-in partners. Second, except for one pair of rental partners, almost all the formal contracts represent bargaining outcomes that obtain when renting-in agents propose formal contracts.

Table 6: Rental Partners’ Preferences for Contractual Formality

	$\tilde{C} = 0$	$\tilde{C} = 1$	Cum.
$C^{O*} = 0$ $C^{in*} = 0$	17	1	18
$C^{O*} = 0$ $C^{in*} = 1$	26	57	83
$C^{O*} = 1$ $C^{in*} = 1$	6	30	36
$C^{O*} = 1$ $C^{in*} = 0$	4	0	4
	Total		141

2.2.2 Non-Agricultural Income Shocks and Location Specificity

PROPOSITIONS 1 AND 2 predict the impact of non-agricultural income shocks (s) and location specificity (α and $\frac{L}{\bar{L}}$) on rental partners’ optimal contractual formality (C^{O*} and C^{in*}). The empirical tests of PROPOSITIONS 1 AND 2 serve as the footstone for testing the bargaining mechanism presented in PROPOSITION 3 and computing ex-ante bargaining costs following PROPOSITION 4. Hence, the variables representing non-agricultural income shocks and location specificity are important explanatory variables.

Following Yang (2020), I use the non-agricultural employment status of the family member in a renting-out household who contributes the most value to family finances as a proxy for non-agricultural income shocks s . In the 2010s, most rural households earned at least some non-agricultural income. What dif-

ferentiates the uncertainty associated with such non-agricultural income is employment status—whether the highest-earning family members had signed long-term non-agricultural employment contracts (*LONG NON-AGRI*) or not. In the subsample, 59.6% of the family members who contribute the most value to family finances in renting-out households had signed long-term non-agricultural employment contracts, indicating that these renting-out households experience less severe non-agricultural income shocks. Following the prediction derived from PROPOSITION 1, *LONG NON-AGRI* should reduce C^{o*} while increasing C^{in*} .

Location specificity consists of two factors: location importance and scale importance. I use *BORDER* to indicate whether a renting-out household's farmland is sited along the border of an adjacent piece of farmland to measure the location importance of a piece of land α . If *BORDER* applies to a given case, it represents a lower degree of location importance. Following the prediction derived from PROPOSITION 2, *BORDER* should reduce C^{in*} . In the subsample, 44.7% of the rented out plots are located along a property border, indicating that larger-scale rentals have expanded their rentals from borders to the interior. I use the logs of renting-in scales ($\text{Log } \text{SCALE}^{in}$) and renting-out scales ($\text{Log } \text{SCALE}^o$) to measure the scale importance. Controlling for a given renting-in scale, the greater the renting-out scale, the greater the scale importance. Following the prediction derived from PROPOSITION 2, an incremental rise in $\text{Log } \text{SCALE}^o$ should increase C^{in*} while an incremental rise in $\text{Log } \text{SCALE}^{in}$ should reduce C^{in*} .

2.2.3 Other Controls

Two other aspects of rental attributes might also affect the bargaining process over contractual formality. In addition, because of the lack of transaction-level data in the existing literature, we know too little about the attributes of rentals that are related to larger renting-in scales. Therefore, describing these control variables in the subsample provides the entire range of rentals with larger renting-in scales.

The first aspect of rental attributes involves the relationship between rental partners, which involves identifying the renting-in agents and understanding how likely it is that the rental partners trust each other to capture the relationship. The identities of renting-in agents depend on whether or not they are non-strangers to renting-out agents (*NON-STRANGER*) and whether or not they were registered as enterprises (*ENTERPRISE*). Because the conventionally used rural household survey could not be used to survey market participants who are not villagers, the stereotypical image of China's rural land rental market is that almost all transactions occur within a given village (Jin and Deininger, 2009). The transaction-level data show that China's rural land rental market has expanded beyond villages. Especially in connection with larger renting-in scales in mature markets, around 40% of the renting-in agents are strangers to the villages where they rent land, and 65.2% of the renting-in agents participate in the market as registered enterprises. The stereotypical renting-in agents—individual renting-in agents who are non-strangers to a village (*NON STRANGER*=1&*ENTERPRISE*=0), represent only 21% of the subsample.

In addition to the identities of renting-in agents, the trust environment in a village might also affect the relationship between rental partners. *AGGR VILL TRUST* represents village-level aggregate trust generated by individual trust between non-strangers in land rental issues using the leave-one-out strategy. *AGGR VILL*

TRUST reflects how renting-out agents could bond socially as a collective group and how likely it is that the renting-out agents deploy various bargaining strategies when working with renting-in agents of varying identities. A more trusting environment makes a renting-out group more powerful when pressuring renting-in agents to compromise in bargaining.

The second aspect of rental attributes is the pattern of bargaining. The key pattern involves whether rental partners bargain directly with each other without using a third party, which would commonly be a village administration. I use *DIRCT COMM* to capture this aspect of rentals. Without a third party involved in the bargaining (*DIRCT COMM*=1), rental partners express their conflicting preferences, or even their unwillingness to compromise, directly to one another.

Facilitating rentals with larger renting-in scales is a recent trend in China's rural land rental market. There is little information regarding the attributes of these large-scale rentals. Without appropriate data in the existing literature, two rumors about such large-scale rentals have spread widely. First, some believe that stranger renting-in agents, especially enterprises from the outside the villages, are more likely to arrange large-scale rentals. Second, some believe that village administrations fully manipulate large-scale rentals. A comparison of rental attributes between the 141 contracts for larger-scale rentals and the 191 contracts for smaller-scale rentals made possible by the results reported in Table 7 provides a glimpse of the entire range of large-scale rentals in China's rural land rental market in the 2010s.

Table 7: Rental Attributes across Samples

		No. Obs	Mean	Std.Err.	Diff P Value
<i>NON-STRANGER</i>	Full Sample	191	0.366	0.035	0.000***
	Subsample	141	0.610	0.041	
<i>ENTERPRISE</i>	Full Sample	191	0.508	0.036	0.008**
	Subsample	141	0.652	0.040	
<i>AGGR VILL TRUST</i>	Full Sample	191	26.365	0.818	0.000***
	Subsample	141	18.187	0.918	
<i>DIRCT COMM</i>	Full Sample	191	0.393	0.035	0.131
	Subsample	141	0.312	0.039	

In Table 7 I sketch the contours of large-scale rentals, refuting the abovementioned rumors. First, inside “big bosses” rather than outside “big bosses” can leverage advantages when arranging large-scale rentals. In the subsample of 141 large-scale rentals, the percentages of *NON-STRANGER* and *ENTERPRISE* are significantly higher than for those among the remaining 191 small-scale rentals. In particular, the percentage of *NON-STRANGER* involved in large-scale rentals is almost 1.5 times that in small-scale rentals, indicating that social proximity is vital in arranging large-scale rentals. Second, the involvement of village administrations is not significantly different between large-scale and small-scale rentals. Among large-scale rentals, 31.2% of rental contracts are bargaining outcomes reached without the involvement of a third party, a percentage that is not significantly lower than that among small-scale rentals. Although village administrations

are involved in more than half of the rental contracts in the subsample, the statistics show that the role of village administrations was weakening in China's mature land rental market in the 2010s. More importantly, village administrations are not the key to arranging large-scale rentals, a fact that may be related to statistics indicating that large-scale rentals are more likely to occur between non-strangers. In addition to disproving the two abovementioned rumors, the results reported in Table 7 also reveal that an environment that is low in trust of non-strangers facilitates large-scale rentals. The percentage of renting-out agents who are more trusting of non-strangers regarding land rental issues is significantly lower in large-scale rentals, indicating that trust combined with social proximity impedes the spread of large-scale rentals.

Because location specificity constrains the bargaining rounds associated with large-scale rentals, ex-ante bargaining costs affect rental scales. The results reported in Table 7 further indicate the factors that affect ex-ante bargaining costs. First, social proximity potentially reduces ex-ante bargaining costs, facilitating the arrangement of large-scale rentals. Second, trust within a social group could indeed increase ex-ante bargaining, offsetting the advantages derived from social proximity. Third, the support of a village administration may not reduce ex-ante bargaining costs as expected, which highlights the importance of investigating and solving the problem of ex-ante bargaining costs in mature land rental markets.

3 Empirical Analysis

Consistently with this study's theoretical considerations, the empirical analysis occupies three subsections that test PROPOSITIONS 1–4 successively. I first estimate the individual preferences, then test the compromise mechanism, and finally calculate the ex-ante bargaining costs. Each subsection begins with an empirical strategy followed by the corresponding empirical results and analyses.

3.1 Individual Preferences for Contractual Formality

In this subsection I focus on explaining rental partners' preferences for contractual formality. By testing PROPOSITIONS 1–2, I reveal that ex-post contract violation uncertainty and location specificity are responsible for rental partners' conflicting preferences for contractual formality. I begin this subsection by describing the empirical strategy, followed by reporting the empirical results and discussing those results.

3.1.1 Empirical Strategy

The first-order conditions characterized by renting-out agents' and renting-in agents' preferences for contractual formality (C_{ij}^{o*} and C_{ij}^{in*}), determine the empirical testing strategy PROPOSITIONS 1–2. The renting-out agents' income shocks (s_{ij}) affect both the renting-out agents' and renting-in agents' preferences over contractual formality. I use *LONG NON-AGRI* to measure s_{ij} . I represent the scale importance of renting-out agents' land plots with two variables, the renting-out scale (L_{ij}) and the renting-in scale ($\bar{L}_{ij}$). While the renting-out scale affects both C_{ij}^{o*} and C_{ij}^{in*} , the renting-in scale affects only the decision regarding C_{ij}^{in*} because the renting-out agents include only single pieces of land in their profit-maximization calculations.

I use Log SCALE^o and Log SCALE^{in} to measure L_{ij} and $\bar{L}_{ij}$, respectively. For a similar reason, location importance (α_{ij}) appears only in the regression of C_{ij}^{in*} . I use $BORDER$ to measure location importance.

Williamson (2000) highlights that it is the combination of uncertainty and asset specificity that makes ex-post adaptation hazardous. Therefore, interactions between non-agricultural incomes and location specificity are key to explaining rental partners' preferences for contractual formality. Because the 141 rental contracts in the subsample are associated with 17 renting-in agents, the variations in renting-in scales are much smaller than the variations in renting-out scales. Thus, controlling for renting-in scales, scale importance is represented primarily by the renting-out scales. Thus, interactions occur mainly between non-agricultural income shocks (s_{ij}), location importance (α), and the renting-out scale (L_{ij}).

Meanwhile, following the theoretical considerations, other parameters such as institutionally determined violation compensation and the costs involved in writing contracts also affect both C_{ij}^{o*} and C_{ij}^{in*} . Variables that capture the relationship between rental partners contained in vector $\mathbf{W}_{ij}$ could control for the impact of these parameters on C_{ij}^{o*} and C_{ij}^{in*} in a reduced-form approach. These variables include $\mathbf{W}_{ij}$ are *NON-STRANGER*, *ENTERPRISE*, and *AGGR VILL TRUST*. Because only a limited number of rental contracts can be agreed to within a village in any given year, the fixed effects for the year in which contracts were signed are difficult to apply in the analysis. I use *AFTER 2006*, denoted as T_{ij} , to control for differences between pre-2006 and post-2006 rental contracts because the central government announced a series of pro-agriculture policies in 2006, including the abolishment of agricultural taxes. Hence, the empirical model for rental partners' preferences for contractual formality (C_{ij}^{o*} and C_{ij}^{in*}) associated with rental contract i in village j is the following:

$$C_{ij}^{o*} = \beta_0^o + \beta_1^o s_{ij} + \beta_2^o L_{ij} + \beta_3^o s_{ij} \times L_{ij} + \beta_4^o T_{ij} + \mathbf{W}_{ij} \gamma^o + \mu_j^o + \varepsilon_{ij}^o \quad (11)$$

$$C_{ij}^{in*} = \beta_0^{in} + \beta_1^{in} s_{ij} + \beta_2^{in} L_{ij} + \beta_3^{in} \bar{L}_{ij} + \beta_4^{in} \alpha_{ij} + \beta_5^{in} L_{ij} \times \alpha_{ij} + \beta_6^{in} s_{ij} \times L_{ij} + \beta_7^{in} s_{ij} \times \alpha_{ij} + \beta_8^{in} s_{ij} \times \alpha_{ij} \times L_{ij} \\ + \beta_9^{in} T_{ij} + \mathbf{W}_{ij} \gamma^{in} + \mu_j^{in} + \varepsilon_{ij}^{in} \quad (12)$$

The rental partners' preferences for contractual formality, C_{ij}^{o*} and C_{ij}^{in*} , are dummy variables. To apply village fixed effects captured by μ_j^o and μ_j^{in} , Eqs. 11 and 12 are linear probability models. I assume that ε_{ij}^o and ε_{ij}^{in} are independently and normally distributed at zero means. Because rental partners are exogenously matched, it is reasonable to assume that renting-out agents' non-agricultural income shocks (s_{ij}), location specificity (L_{ij} , $\bar{L}_{ij}$, and α), and the relationship between rental partners ($\mathbf{W}_{ij}$) are not correlated with either ε_{ij}^o or ε_{ij}^{in} . It is possible, however, that $\text{corr}(\varepsilon_{ij}^o, \varepsilon_{ij}^{in}) \neq 0$ as a result of unobserved rental-partner characteristics or omitted variables related to rental attributes that affect both C^{o*} and C^{in*} . Therefore, Eqs. (11) and (12) constitute a two-linear-probability system to be estimated using full information maximum likelihood estimation (FIML) to address this potential for correlation between ε_{ij}^o and ε_{ij}^{in} . Moreover, because it is also possible that individuals' contractual formality preferences are correlated within a given village because of village-level institutions, I cluster standard errors at the village level.

3.1.2 Empirical Results

To obtain the results reported in Table 8, I use four sets of specifications to estimate rental partners' contractual formality preferences and test PROPOSITIONS 1–2. Among the four sets of specifications, the correlation between ε_{ij}^o and ε_{ij}^{in} are not significant, indicating that omitted variables do not seriously affect the estimations. For columns (1) and (2) and columns (7) and (8), more control variables, especially interactions between the variables in $\mathbf{W}_{ij}$, are added, improving the empirical examination of PROPOSITIONS 1–2. I focus on interpreting the empirical results reported in columns (7) and (8).

First, *LONG NON-AGRI*, which represents milder non-agricultural income shocks, significantly reduces renting-in agents' preferred contractual formality, while also significantly reducing renting-out agents' preferences. These results are consistent with PROPOSITION 1, which implies that a small non-agricultural income shock increases C_{ij}^{o*} but reduces C_{ij}^{in*} . Based on the summary statistics reported in Table 2, renting-in agents' contractual formality preferences are, on average, much stronger than renting-out agents' preferences. Hence, ex-post contract violation uncertainty could further enlarge the difference between rental partners' preferences, enhancing bargaining difficulties.

Second, the empirical results verify PROPOSITION 2. As *BORDER* represents a lower degree of location importance, it significantly reduces renting-in agents' preference for contractual formality. It is challenging to test the impact of scale importance directly because the renting-out scales (*Log SCALE^o*) that capture most of the scale importance are also related to other parameters in the theoretical model, for example to rents (r) and renting-out agents' agricultural production function ($w_a^o(L)$). Therefore, the coefficient associated with *Log SCALE^o* is a mixture of multiple mechanisms. Interaction between *BORDER* and *Log SCALE^o* better captures the impacts of scale importance on C_{ij}^{o*} . If a land plot is located along a *BORDER*, the increment in scale importance represented by a larger *Log SCALE^o* significantly increases C_{ij}^{in*} , offsetting the negative impacts of *BORDER* on C_{ij}^{in*} . Because the average C^{in*} is greater than the average C^{o*} , location specificity—either location importance or scale importance—further exacerbates the conflict between preferences.

Third, the coefficients associated with interaction between non-agricultural income shocks and location specificity support Williamson's argument that the combination of uncertainty and location specificity is the key to ex-post adaptation. Conditional on the fact that lower ex-post contract violation uncertainty, represented by *LONG NON-AGRI*, significantly increases C_{ij}^{o*} while reducing C_{ij}^{in*} , an incremental increase in scale importance (*Log SCALE^o*) offsets the positive impact of a lower degree of uncertainty in narrowing the difference in preferences between rental partners. In addition, keeping ex-post adaptation uncertainty and scale importance fixed, lower location importance (*BORDER*) could further reduce C_{ij}^{in*} while also reducing the difference between C_{ij}^{o*} and C_{ij}^{in*} .

In addition to reporting the results of the empirical analyses of PROPOSITIONS 1–2, other results reported in Table 8 shed light on the empirical puzzle regarding the relationship between social proximity and contractual governance (Carson, Madhok and Wu, 2006; Cao and Lumineau, 2015). The results reported in columns (7) and (8) show that, compared with stranger rental partners, non-stranger renting-out agents

are less likely, but non-stranger renting-in agents are more likely, to propose formal contracts. Hence, the impact of social proximity on renting-out agents' and renting-in agents' preferences for contractual formality run in opposite directions. The final contractual governance, thus, involves bargaining outcomes, which potentially explains the contradictory results reported in the literature generated by various data sources distributed across multiple industrial settings.

Compared with stranger rental partners, non-stranger rental partners enter bargaining with wider differences between their preferences. A trusting environment for non-strangers, *AGGR VILL TRUST*, could offset the impacts of *NON STRANGER* on rental partners' preferences for contractual formality. If rental partners are non-strangers, a more fully trusting environment for non-strangers would encourage renting-out agents to propose formal contracts while discouraging renting-in agents. Therefore, *AGGR VILL TRUST* narrows the difference in preferences between non-stranger rental partners, smoothing the bargaining.

3.2 Compromise Mechanism

In this subsection I present tests of the compromise mechanism elaborated in PROPOSITION 3, according to which the agent who incurs lower compromise costs is the one who compromises. Based on the empirical results presented in Subsection 3.1, I first measure the compromise decisions and the compromise costs. I then construct an empirical strategy to test PROPOSITION 3 and present the resulting analysis based on the empirical results.

3.2.1 Measuring Compromise Decisions

The survey presents only two options associated with preferences for contractual formality (C^{m*}): formal or informal contracts. A rental partner's preference for contractual formality could still, however, vary between agents who propose the same type of contract. Hence, I use $prob(\hat{C}^{m*} = 1)$ instead of C^{m*} to further distinguish contractual formality preferences at the same value. Eqs (11) and (12) make it possible to estimate the probability that an agent proposes a formal contract, providing a more precise measurement of rental partners' preferences.

Because the rental partners' preferences are measured by $prob(\hat{C}^{m*} = 1)$, the chances that $prob(\hat{C}^{o*} = 1) = prob(\hat{C}^{in*} = 1)$ are trivial. Thus, in the bargaining over contractual formality, all pairs of rental partners experience conflicting preferences to varying degrees. The bargaining outcomes for successfully agreed-upon rental transactions must result from compromise on the part of one of the agents involved. Therefore, without loss of generality, I define a dummy variable as a proxy for a renting-in agent's compromise ($COMP^{in}$) by rental partners' preferences ($prob(\hat{C}^{m*} = 1)$) and the bargaining outcomes on contractual formality ($\tilde{C}$). I define $COMP^{in} = 1$ if either of the following two situations occurs:

$$\begin{aligned} & prob(\hat{C}^{in*} = 1) > prob(\hat{C}^{o*} = 1) \text{ and } \tilde{C} = 0 \\ & prob(\hat{C}^{in*} = 1) \leq prob(\hat{C}^{o*} = 1) \text{ and } \tilde{C} = 1 \end{aligned}$$

Table 8: Renting-in and Renting-out Agents' Preferences for Contractual Formality

	(1) C^{o*}	(2) C^{in*}	(3) C^{o*}	(4) C^{in*}	(5) C^{o*}	(6) C^{in*}	(7) C^{o*}	(8) C^{in*}
Non-Agricultural Income Shocks and Location Specificity								
LONG NON-AGRI	0.325 (0.352)	-0.807*** (0.289)	0.323 (0.281)	-0.805*** (0.302)	0.417*** (0.211)	-0.784*** (0.289)	0.396* (0.213)	-0.745*** (0.275)
Log $SCALE^o$	0.195* (0.116)	-0.286*** (0.107)	0.227** (0.111)	-0.281*** (0.108)	0.268*** (0.109)	-0.269*** (0.0906)	0.269** (0.109)	-0.281*** (0.0893)
LONG NON-AGRI $\times$ Log $SCALE^o$	-0.186 (0.194)	0.441*** (0.160)	-0.198 (0.155)	0.439*** (0.169)	-0.247** (0.121)	0.427*** (0.160)	-0.233* (0.122)	0.399*** (0.137)
BORDER		-0.610*** (0.204)		-0.606*** (0.192)		-0.601*** (0.176)		-0.621*** (0.189)
LONG NON-AGRI $\times$ BORDER		0.660 (0.495)		0.656 (0.473)		0.659 (0.474)		0.673 (0.501)
BORDER $\times$ Log $SCALE^o$		0.317** (0.129)		0.317*** (0.121)		0.314*** (0.111)		0.324*** (0.121)
LONG NON-AGRI $\times$ BORDER $\times$ Log $SCALE^o$		-0.442* (0.236)		-0.441* (0.226)		-0.443* (0.226)		-0.448* (0.235)
Log $SCALE^{in}$		-0.0806 (0.118)		-0.0856 (0.0988)		-0.0893 (0.0928)		-0.112 (0.0828)
Other Rental Attributes								
NON STRANGER			0.0737 (0.0837)	0.0149 (0.0951)	-0.137 (0.0853)	-0.0391 (0.156)	-0.247*** (0.0754)	0.230*** (0.0766)
ENTERPRISE			0.216** (0.0999)	0.0397 (0.141)	0.0453 (0.0573)	-0.00307 (0.166)	0.0549 (0.0631)	-0.0244 (0.161)
AGGR VILL TRUST			0.0144 (0.0295)	0.00149 (0.00957)	0.0148 (0.0277)	0.00152 (0.00931)	0.00963 (0.0253)	0.0141 (0.0142)
NON STRANGER $\times$ ENTERPRISE					0.367*** (0.109)	0.0932 (0.133)	0.343*** (0.124)	0.158 (0.178)
NON STRANGER $\times$ AGGR VILL TRUST							0.00621*** (0.00214)	-0.0154*** (0.00289)
AFTER 2006	0.143** (0.0619)	0.0141 (0.0604)	0.133* (0.0778)	0.0114 (0.0790)	0.172*** (0.0598)	0.0219 (0.0802)	0.208*** (0.0434)	-0.0631*** (0.0173)
Constant	-0.184 (0.200)	1.472*** (0.436)	-0.458* (0.276)	1.451*** (0.276)	-0.372 (0.277)	1.487*** (0.292)	-0.305 (0.245)	1.428*** (0.294)
Observations	141	141	141	141	141	141	141	141
Village Fixed-Effects	Y	Y	Y	Y	Y	Y	Y	Y
Log pseudolikelihood	-112.356	-112.356	-108.656	-108.656	-106.055	-106.055	-103.199	-103.199
ρ_{ho12}	0.075 (0.074)	0.075 (0.074)	0.070 (0.070)	0.070 (0.070)	0.0612 (0.070)	0.0612 (0.070)	0.076 (0.060)	0.076 (0.060)

Clustered standard errors at the village level in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

In the definition of $COMP^m$, I use the relative difference between $prob(\hat{C}^{o*} = 1)$ and $prob(\hat{C}^{in*} = 1)$ to capture the difference in rental partners' answers indicating their preferences for contractual formality in the dummy-variable setting. I label the renting-in agent as the agent who compromises in either of two scenarios. First, when the renting-in agent prefers a more formal contract than the renting-out agent, $COMP^m = 1$ if the final contractual formality is informal ($\tilde{C} = 0$). Second, when the renting-in agent prefers a less formal contract than the renting-out agent, $COMP^m = 1$ if $\tilde{C} = 1$.

Based on the definition of $COMP^{in}$, I report the summary statistics for $COMP^{in}$ in Tables 9 and 10. The statistics reported in Table 9 show that most informal contracts result from renting-in agents' compromises, while most formal contracts are supported by renting-out agents' compromises. In Table 10 the results further characterize the relationship between $COMP^{in}$ and the combination of rental partners' preferences. Renting-in agents compromise in around 35% of the 141 rental contracts, while 82% of the 50 rental contracts that are bargaining outcomes of renting-in agents' compromises are associated with $C^{o*} = 0$. Among the 91 contracts for which renting-out agents compromise ($COMP^{in} = 0$), 94.5% are associated with $C^{in*} = 1$. Therefore, once rental partners propose their typical preferences ($C^{o*} = 0$ and $C^{in*} = 1$), they are less likely to compromise. Among the 71 contracts involving typical combinations of rental partners' preferences, 80% end up with renting-out agents' compromising.

Table 9: $COMP^{in}$ and Bargaining Outcomes ($\tilde{C}$)

	$COMP^{in} = 0$	$COMP^{in} = 1$
$\tilde{C} = 0$	6	47
$\tilde{C} = 1$	85	3

Table 10: $COMP^{in}$ and Rental Partners' Preferences (C^{o*} and C^{in*})

	$COMP^{in} = 0$		$COMP^{in} = 1$	
	$C^{in*} = 0$	$C^{in*} = 1$	$C^{in*} = 0$	$C^{in*} = 1$
$C^{o*} = 0$	3	57	27	14
$C^{o*} = 1$	2	29	2	7
Total	91		50	

3.2.2 Measuring Compromise Costs

I take advantage of the estimations of $prob(\hat{C}^{o*} = 1)$ and $prob(\hat{C}^{in*} = 1)$ to generate an index for compromise costs ($H^m(C^{m*}) - H^m(C^{n*})$).

If the probability that agent m requests a formal contract is close to 1 or 0, m has a strong preference for a formal or informal contract, respectively. Therefore, agent m would incur a high compromise cost if he/she were to move away from the individual optimal contractual formality. On the other hand, if the probability

that agent m requests a formal contract is close to 50%, agent m is almost indifferent between a formal and an informal contract, which indicates that agent m 's compromise costs associated with moving away from C^{m*} are lower. Therefore, I use $|prob(\hat{C}^{m*} = 1) - 0.5|$ as the index for $compcost^m$, theoretically scaled between 0 and 0.5. Because $prob(\hat{C}^{m*} = 1)$ is estimated in Eqs. (11) and (12) using a linear probability model, it allows the predicted values of $prob(\hat{C}^{m*} = 1)$ to range beyond 0 and 1. Hence, for very few observations, $compcost^m$ could be slightly below 0 or above 0.5.

Figure 1 displays the statistics associated with $compcost^m$. First, the average renting-out agents' compromise cost is 0.288, which is lower than the average renting-in agents' compromise cost of 0.350. Second, the 75th percentile of $compcost^o$ is 0.354 while the 75th percentile of $compcost^{in}$ is almost 0.5. Thus, combining the statistics reported in Table 9, the summary statistics roughly verify PROPOSITION 3, which holds that renting-in agents compromise on only 35% of the contracts because renting-in agents on average experience higher compromise costs.

Figure 1: Summary Statistics of $compcost^o$ and $compcost^{in}$



Note: The compromise costs are theoretically scaled between 0 and 0.5. The linear probability models given by Eqs. (11) and (12) make it possible for $prob(\hat{C}^{m*} = 1)$ to range below 0 or above 1. Therefore, for a very few observations, $compcost^m$ could be slightly below 0 or above 0.5. The average renting-out agents' compromise cost is 0.288. The average renting-in agents' compromise cost is 0.350. The average $compcost^o$ is lower than the average of $compcost^{in}$. The 75th percentile of $compcost^o$ is 0.354 while the 75th percentile of $compcost^{in}$ is almost 0.5.

3.2.3 Empirical Strategy

I test PROPOSITION 3 to empirically examine whether a compromise decision ($COMP^{in}$) is affected by the difference between rental partners' compromise costs ($compcost^{in} - compcost^o$). In addition to its sensitivity to rental partners' compromise costs, the compromise decision is also affected by the relationship between the rental partners ($\mathbf{W}_{ij}$) and the bargaining pattern. I use *DIRECT COMM* to measure bargaining patterns (B_{ij}). As the central government improves the security of rural land property rights and issues new pro-agriculture policies, rural citizens' bargaining powers evolve over time. Although it is infeasible to apply the fixed effects associated with the year the contract is signed, I use *AFTER 2006*, denoted as T_{ij} , to control for the time effects. The empirical model of the compromise decision $COMP^{in}$ associated with contract i in village j is the following:

$$COMP_{ij}^{in} = \phi_0 + \phi_1(compcost_{ij}^{in} - compcost_{ij}^o) + \phi_2 B_{ij} + \phi_3 T_{ij} + \mathbf{W}_{ij}\boldsymbol{\kappa} + \zeta_j + \eta_{ij} \quad (13)$$

To ensure the applicability of the village fixed effects captured by ζ_j , Eq. (13) is a linear probability model. I assume that η_{ij} is independently and normally distributed at a zero mean. The measurements of compromise costs ($compcost^{in}$ and $compcost^o$) are derived from the estimated probabilities involved in

proposing formal contracts based on Eqs. (11) and (12), after removing the unobserved residuals in the preferences C^{in*} and C^{o*} that are potentially correlated with η_{ij} . In addition, because rental partners are matched exogenously, $\mathbf{W}_{ij}$, which represents the relationship between rental partners, is not correlated with η_{ij} . The bargaining pattern measured by *DIRECTCOMM* is related to village institutions. At the village level, it is possible that some renting-in agents' characteristics that also function endogenously in the bargaining match with the village institutions. It is unlikely that the bargaining pattern matches endogenously with the bargaining outcomes at the transactional level. Hence, it is reasonable to assume that B_{ij} is uncorrelated with η_{ij} . Standard errors are clustered at the village level.

3.2.4 Empirical Results

I report the empirical results of my analysis of compromise costs in Table 11. I use five sets of specifications to test the robustness of the compromise mechanism. For columns (1), I use both $compcost^{in}$ and $compcost^o$ as explanatory variables. For columns (2)–(5), to maintain consistency with the theory, I use the difference between $compcost^{in}$ and $compcost^o$ as the explanatory variable. For columns (3)–(5), I apply additional interactions between variables in vector $\mathbf{W}_{ij}$ and B_{ij} . The five sets of specifications consistently support my characterization of the compromise mechanism described in PROPOSITION 3, according to which the agent facing lower compromise costs is more likely to compromise.

Because $compcost^o$ and $compcost^{in}$ are estimated using a linear probability model, these two variables could fall beyond the model's theoretical range that runs between 0 and 0.5. I truncate these two variables by setting $compcost^m \leq 0$ at 0 and $compcost^m \geq 0.5$ at 0.5. Eight observations of $compcost^o$ and 28 observations of $compcost^{in}$ measure greater than 0.5. Using truncated compromise costs, I re-run the regressions associated with Table 11 and report the results in Table 12. These results, which were obtained using truncated compromise costs, are in general consistent with the results reported in Table 11, except that the magnitudes and significance of the coefficients associated with compromise costs are higher when using truncated compromise costs. I next focus on interpreting the empirical results reported in Table 12.

In Table 12, the result reported in column (1) indicate that renting-out agents are more sensitive to their compromise costs when adjusting their compromise decisions. As the renting-out agent's truncated compromise costs increase by 0.1 units, the probability that the renting-in agent will compromise increases significantly, by 5.65 percentage points. I obtained the results reported in columns (2)–(5) to test PROPOSITION 3 directly using the difference between rental partners' compromise costs. Across a range of specifications, the empirical results show consistently that, if the difference between $compcost^{in}$ and $compcost^o$ increases, the renting-in agent facing higher compromise costs is significantly less likely to compromise in the bargaining, supporting PROPOSITION 3. As the results reported in columns (2)–(5) show, after adding additional controls and interactions between $\mathbf{W}_{ij}$ and B_{ij} , the compromise mechanism reflected by the coefficient associated with $compcost^{in} - compcost^o$ is robust with even greater efficacy in explaining the compromise mechanism.

In column (5) of Table 12, I report the main results. The 0.1-unit increase in truncated $compcost^{in} -$

Table 11: Renting-in Agents' Compromise ($COMP^{in}$)

VARIABLES	(1) $\tilde{C}$	(2) $\tilde{C}$	(3) $\tilde{C}$	(4) $\tilde{C}$	(5) $\tilde{C}$
Compromise Costs					
$compcost^o$	0.419* (0.214)				
$compcost^{in}$	-0.256 (0.188)				
$compcost^{in} - compcost^o$		-0.338** (0.105)	-0.372* (0.186)	-0.614* (0.269)	-0.601* (0.270)
Other Bargaining Attributes					
DIRECT COMM			-0.121 (0.0888)	-0.114 (0.0749)	-0.00404 (0.449)
NON STRANGER			-0.0808 (0.0736)	-0.149 (0.232)	-0.113 (0.120)
ENTERPRISE			-0.00860 (0.116)	-0.137 (0.200)	-0.131 (0.139)
AGGR VILL TRUST			0.0389* (0.0167)	0.0471* (0.0218)	0.0485 (0.0255)
NON STRANGER×AGGR VILL TRUST				-0.00793 (0.00763)	-0.00838 (0.00768)
NON STRANGER×ENTERPRISE				0.348* (0.146)	0.406 (0.229)
DIRECT COMMONON×NON STRANGER					-0.130 (0.663)
DIRECT COMM×ENTERPRISE					-0.0564 (0.550)
DIRECT COMM × NON STRANGER×ENTERPRISE					-0.0275 (0.820)
AFTER 2006	-0.204 (0.144)	-0.214 (0.134)	-0.123 (0.0883)	-0.0873 (0.0512)	-0.0869 (0.0631)
Constant	0.811*** (0.141)	0.843*** (0.114)	0.490* (0.203)	0.470 (0.354)	0.423 (0.334)
Observations	141	141	141	141	141
Village Fixed-Effects	Y	Y	Y	Y	Y
R-squared	0.512	0.512	0.547	0.564	0.567

Clustered standard errors at the village level in parentheses

$p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 12: Renting-in Agents' Compromise ($COMP^{in}$)

VARIABLES	(1) $\tilde{C}$	(2) $\tilde{C}$	(3) $\tilde{C}$	(4) $\tilde{C}$	(5) $\tilde{C}$
Truncated Compromise Costs					
truncated $compcost^o$	0.565*				
	(0.256)				
truncated $compcost^{in}$	-0.339				
	(0.246)				
truncated $compcost^{in} - compcost^o$		-0.464**	-0.486**	-0.805**	-0.791**
		(0.151)	(0.175)	(0.242)	(0.237)
Other Bargaining Attributes					
DIRECT COMM			-0.119	-0.107	0.00767
			(0.0889)	(0.0700)	(0.452)
NON STRANGER			-0.0824	-0.0913	-0.0515
			(0.0740)	(0.240)	(0.116)
ENTERPRISE			-0.00468	-0.138	-0.129
			(0.101)	(0.195)	(0.135)
AGGR VILL TRUST			0.0378*	0.0485*	0.0497*
			(0.0160)	(0.0213)	(0.0246)
NON STRANGER×AGGR VILL TRUST				-0.0116	-0.0120
				(0.00692)	(0.00673)
NON STRANGER×ENTERPRISE				0.365*	0.410*
				(0.165)	(0.206)
DIRECT COMMONON×NON STRANGER					-0.139
					(0.651)
DIRECT COMM×ENTERPRISE					-0.0666
					(0.546)
DIRECT COMM × NON STRANGER×ENTERPRISE					-0.00201
					(0.803)
AFTER 2006	-0.198	-0.210	-0.120	-0.104*	-0.103
	(0.149)	(0.129)	(0.0764)	(0.0459)	(0.0550)
Constant	0.774***	0.815***	0.476**	0.409	0.364
	(0.169)	(0.115)	(0.170)	(0.329)	(0.308)
Observations	141	141	141	141	141
Village Fixed-Effects	Y	Y	Y	Y	Y
R-squared	0.520	0.519	0.553	0.573	0.576

Clustered standard errors at the village level in parentheses

 $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

$compcost^o$ is associated with a 7.9 percentage point reduction in the probability that renting-in agents compromise. The maximum possible value of $compcost^{in} - compcost^o$ is 0.5, which occurs when the renting-in agent exhibits an extremely strong preference for a formal contract, at $prob(\hat{C}^{in*} = 1) = 1$, and the renting-out agent is indifferent between a formal and an informal contract, at $prob(\hat{C}^{o*} = 0.5)$. Therefore, compared with the situation in which both rental partners are indifferent to contractual formality, the 0.5-unit difference between $compcost^{in}$ and $compcost^o$ reduces the probability that renting-in agents compromise by 39.5 percentage points.

The results reported in columns (3)–(5) of Table 12 demonstrate that the compromise mechanism reflected by compromise costs is the key to explaining compromise decisions. Other rental attributes that would affect the bargaining, such as the relationship between rental partners or the bargaining pattern, are comparatively weak as explanations of compromise decisions. Only *AGGR VILL TRUST* and interaction between *NON STRANGER* and *ENTERPRISE* significantly affect $COMP^{in}$. *AGGR VILL TRUST* measures the collective power of renting-out agents. As this measure rises by one percentage point, the renting-in agent is 4.97 percentage points more likely to compromise in the bargaining. Compared with renting-in agents who are strangers and individuals, *NON STRANGER* $\times$ *ENTERPRISE* renting-in agents are 41 percentage points more likely to compromise. Entrepreneurs who are non-strangers to a given village may experience a reputation cost associated with socially enforced sympathy (Yang, 2020). Renting-out agents often regard *NON STRANGER* $\times$ *ENTERPRISE* renting-in agents as those who “get rich first.” Therefore, *NON STRANGER* $\times$ *ENTERPRISE* renting-in agents who bargain too stubbornly may experience reputation costs in the relevant village that would likely affect their post-rental economic activities negatively.

These same results reported in columns (3)–(5) of Table 12 further refute the rumor related to the role of village administrations in land rentals. With varying sets of specifications, neither *DIRECT COMM* nor the interactions associated with *DIRECT COMM* significantly affect compromise decisions. These results support the argument that village administration involvement does not significantly affect the bargaining process between rental partners no matter the nature of their relationships. In other words, the rumor that village administrations can force rural citizens, especially renting-out agents, to agree to certain types of contractual arrangements associated with land rentals is not credible.

3.3 Ex-ante Bargaining Costs

In this subsection I present my analysis of the monetary value of ex-ante bargaining costs, following PROPOSITION 4. I first distinguish between efficient and inefficient bargaining. I then develop a reduced-form approach to measure the ex-ante bargaining costs. I also discuss transaction costs in China’s mature rural land rental market more broadly.

3.3.1 Efficient Vs. Inefficient Bargaining

In this study’s theoretical framework, efficient bargaining occurs when the theoretically predicted compromising agent ($COMP^{in*}$) is the actual compromising agent ($COMP^{in}$). Thus, inefficient bargaining occurs

when $COMP^{in*} \neq COMP^{in}$. The actual compromising agent ($COMP^{in}$) is defined and measured in Subsection 3.2.1 based on rental partners' preferences and bargaining outcomes. In general, the actual compromising agent is the one who is more likely to propose a formal (informal) contract than his/her rental partner but ends up with an informal (formal) contract. Strictly following the compromise mechanism in PROPOSITION 3, I define the theoretically predicted compromising agent as the agent who faces a lower compromise cost, as follows:

$$COMP^{in*} = 1 \text{ if } compcost^o \geq compcost^{in}$$

$$COMP^{in*} = 0 \text{ if } compcost^o < compcost^{in}$$

In Table 13 I report the statistics related to $COMP^{in*}$ and ($COMP^{in}$). Of the 141 rental contracts in the subsample, 17.7% are bargaining outcomes of inefficient bargaining at $COMP^{in*} \neq COMP^{in}$. The inefficient bargaining associated with these 25 rental transactions generates transaction costs.

Table 13: $COMP^{in*}$ Vs. $COMP^{in}$

	$COMP^{in} = 0$	$COMP^{in} = 1$	Total
$COMP^{in*} = 0$	78	12	90
$COMP^{in*} = 1$	13	38	51
Total	91	50	141

Because ex-ante bargaining costs are reflected in rents, in Table 14 I report the summary statistics for rents associated with $COMP^{in}$ and $COMP^{in*}$. Compared with rental contracts that are outcomes of compromise on the part of renting-out agents ($COMP^{in} = 0$), the associated rents ($COMP^{in} = 1$) are roughly 84 RMB lower than they would be without compromise. Similarly, compared with contracts that are theoretically predicted as outcomes of renting-out agents' compromise, the rents associated with contracts at $COMP^{in*} = 1$ are about 58 RMB lower than they would be without compromise. These two comparisons imply two insights. First, monetary transfers between rental partners based on actual compromising agents take place. Second, the rents associated with $COMP^{in} = 1$ and $COMP^{in*} = 1$ are potentially different, indicating the differences in rents associated with efficient and inefficient bargaining.

Table 14: *RENTS* associated with $COMP^{in}$ and $COMP^{in*}$

	No. Obs	Mean	Std.Err.	Diff P Value
$COMP^{in} = 0$	91	499.912	10.176	0.000***
$COMP^{in} = 1$	50	416.600	18.042	
$COMP^{in*} = 0$	90	491.244	12.507	0.004**
$COMP^{in*} = 1$	51	433.529	14.117	

3.3.2 Empirical Strategy

According to PROPOSITION 4, ex-ante bargaining costs equal the differences in rents between efficient and inefficient bargaining while controlling for the same actual compromising agent ($COMP^{in}$). Therefore, the transaction costs are identified by the difference in rents brought about by the actual compromising decisions and theoretically predicted compromising strategies ($COMP^{in}$ and $COMP^{in*}$) while controlling for other factors that would affect the rents in vector $\mathbf{X}_{ij}$. Hence, the following empirical model explains the log of $RENTS$ for contract i in village j :

$$LogRENTS_{ij} = \vartheta_o + \vartheta_1 COMP^{in*} + \vartheta_2 COMP^{in} + \vartheta_3 COMP^{in} \times COMP^{in*} + \mathbf{X}_{ij}\boldsymbol{\tau} + \sigma_j + v_{ij} \quad (14)$$

Eq. (14) is an OLS regression. σ_j represents village fixed effects. I assume that v_{ij} is independently and normally distributed at a zero mean. I cluster standard errors at the village level. Vector $\mathbf{X}_{ij}$ contains all the rental and bargaining attributes that have appeared in previous empirical sectors, which includes non-agricultural income shocks, location specificity, the relationship between rental partners, and the bargaining pattern. In Eq (14), the rent at $COMP^{in*} = COMP^{in} = 0$ is set as the baseline ($\bar{r}$). The empirical measurements of rents in various bargaining scenarios are listed in Table 15.

Table 15: Transactional Prices and Bargaining

$COMP^{in*}$	$COMP^{in}$	Transactional Prices	Empirical Measurements
0	0	$r^* + M^{in,o}$	$\bar{r}$
1	1	$r^* - M^{o,in}$	$\bar{r}e^{\vartheta_1 + \vartheta_2 + \vartheta_3}$
0	1	$r^* + M^{in,o} - TC^{01}$	$\bar{r}e^{\vartheta_2}$
1	0	$r^* - M^{o,in} + TC^{10}$	$\bar{r}e^{\vartheta_1}$

Therefore, following PROPOSITION 4 the transaction costs associated with the two possible inefficient bargaining scenarios are the following:

$$-TC^{01} = \bar{r}(e^{\vartheta_2} - 1)$$

$$TC^{10} = \bar{r}(e^{\vartheta_1} - e^{\vartheta_1 + \vartheta_2 + \vartheta_3})$$

3.3.3 Empirical Results

I report the empirical results related to the measurements of ex-ante bargaining costs in Table 16. In columns (1)–(3) I report consistent and robust empirical results, supporting the theoretical framework presented in Subsection 1.3. As I add more control variables for columns (2) and (3), the significance and magnitudes of the coefficients related to $COMP^{in*}$ and $COMP^{in}$ rise further.

The results reported in Table 15 indicate that the difference in rents between the two efficient bargaining scenarios that might occur, $COMP^{in*} = COMP^{in} = 0$ and $COMP^{in*} = COMP^{in} = 1$, should be negative at $-M^{o,in} - M^{in,o}$. In other words, the rents associated with compromise on the part of renting-in agents should be lower than the rents that apply when renting-out agents compromise. This difference is measured by $\bar{r}(e^{\vartheta_1 + \vartheta_2 + \vartheta_3} - 1)$. The results reported in Table 16 show that the coefficients associated with $COMP^{in*}$ and $COMP^{in}$ are significantly negative and the sums of $\vartheta_1 + \vartheta_2 + \vartheta_3$ are negative across all four sets of specifications. With column (3) displaying the main results, the average rent at $COMP^{in} = COMP^{in*} = 1$ is $0.80\bar{r}$, which is lower than $\bar{r}$. Hence, the empirical results consistently support the theoretical framework. Because the average rent ($\bar{r}$) at $COMP^{in} = COMP^{in*} = 0$ is around 506 RMB per mu per year, the sum of $M^{o,in} + M^{in,o}$ is around $0.2\bar{r}$ at 101 RMB.

Using the results reported in column (3) of Table 16, I compute the ex-ante bargaining costs in two scenarios that might occur and involve inefficient bargaining. First, the rent associated with renting-in agents' failure to compromise ($COMP^{in*} = 0$ & $COMP^{in} = 1$) is $0.75\bar{r}$. Therefore, the ex-ante bargaining cost TC^{01} is around $0.25\bar{r}$. To persuade renting-in agents not to compromise at the expense of the joint surplus, renting-out agents have to pay the transaction costs reflected as a 126.5 RMB reduction in rent the renting-in agents must pay. All 12 contracts associated with renting-in agents' refusal to compromise end up as informal contracts. Second, the rent associated when the renting-out agents refuse to compromise ($COMP^{in*} = 1$ & $COMP^{in} = 0$) is $0.87\bar{r}$. Therefore, the ex-ante bargaining cost TC^{10} is $0.07\bar{r}$ at around 35.42 RMB. The renting-in agents who should compromise need to pay only an extra 35.42 RMB in rent to persuade the renting-out agents to compromise. Eight out of 13 contracts associated with renting-out agents' refusal to compromise end up as formal contracts.

It is therefore easy to underestimate transaction costs if only ex-post adaptation costs are considered. When the theoretically predicted compromising agent would rather pay extra transaction costs to insist on C^{m*} , the ex-post adaptation costs he/she would bear under C^{n*} are greater than the ex-ante bargaining costs. In addition, the theoretically predicted compromising agent's decision to pay the ex-ante bargaining costs rather than compromising sends a precautionary signal to his/her rental partner. That signal is that this theoretically predicted compromising agent is more likely to request ex-post negotiations, raising the ex-post adaptation costs. Hence, rental partners' ex-ante awareness of ex-post adaptation could make it easier to arrive at an agreement during ex-post renegotiations, which reduces the ex-post adaptation cost at the expense of higher ex-ante bargaining costs.

Conclusion

In the relevant literature, several studies have indicated the occurrence of non-trivial transaction costs in rural land rental markets in developing countries (Kimura, Otsuka and Rozelle, 2011). Such transaction costs, however, have not been empirically verified or measured. In the context of China's mature rural land rental markets, which serve as an example for developing countries, I measure these transaction costs in

Table 16: Measuring Ex-ante Bargaining Costs

VARIABLES	(1) Log RENTS	(2) Log RENTS	(3) Log RENTS
Predicted and Actual Compromise			
$COMP^{in*}$	-0.125* (0.0630)	-0.116* (0.0595)	-0.138* (0.0569)
$COMP^{in}$	-0.372*** (0.0701)	-0.387*** (0.0706)	-0.294*** (0.0573)
$COMP^{in*} \times COMP^{in}$	0.175 (0.106)	0.197 (0.130)	0.213* (0.106)
Non-Agricultural Income Shocks and Location Specificity			
LONG NON-AGRI		0.458** (0.163)	0.469 (0.254)
Log $SCALE^o$		0.163 (0.0886)	0.164 (0.108)
LONG NON-AGRI $\times$ Log $SCALE^o$		-0.216** (0.0844)	-0.231 (0.119)
BORDER		-0.0761 (0.188)	-0.0242 (0.205)
LONG NON-AGRI $\times$ BORDER		0.150 (0.350)	0.0535 (0.310)
BORDER $\times$ Log $SCALE^o$		-0.0236 (0.0818)	-0.0355 (0.104)
LONG NON-AGRI $\times$ BORDER $\times$ LOG $SCALE^o$		-0.0250 (0.172)	0.0246 (0.163)
Log $SCALE^{in}$		0.113** (0.0366)	0.0746 (0.0601)
Other Rental and Bargaining Attributes			
DIRECT COMM			0.105 (0.112)
NON STRANGER			0.661*** (0.112)
ENTERPRISE			0.533** (0.156)
AGGR VILL TRUST			-0.0271 (0.0164)
NON STRANGER $\times$ AGGR VILL TRUST			-0.000107 (0.00452)
NON STRANGER $\times$ ENTERPRISE			-0.763** (0.233)
DIRECT COMM $\times$ NON STRANGER			-0.229* (0.0952)
DIRECT COMM $\times$ ENTERPRISE			-0.0595 (0.141)
DIRECT COMM $\times$ NON STRANGER $\times$ ENTERPRISE			0.341** (0.120)
AFTER 2006	0.157 (0.152)	0.146 (0.161)	-0.00233 (0.0718)
Constant	6.003*** (0.121)	5.181*** (0.383)	5.054*** (0.400)
Observations	141	141	141
Village Fixed-Effects	Y	Y	Y
R-squared	0.201	0.246	0.395

Clustered standard errors at the village level in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

monetary value using newly collected transactional-level data in a three-step process. My measurement of transaction costs caused by ex-ante bargaining not only verifies the existence of such transaction costs in China's rural land rental market but also contributes to transaction-cost theory by showing that an analysis that focuses solely on ex-post adaptation costs is likely to underestimate transaction costs in an uncertain environment with asset specificity (Williamson, 1991; Bajara, Houghton and Tadelis, 2014).

First, I find that rental partners' conflicting contractual formality preferences add transaction costs in mature rural land rental markets that impede future market development. I show theoretically and empirically that renting-out agents' non-agricultural income shocks caused by China's dual urban-rural social structure and location specificity caused by China's scattered farmland widen differences in formality preferences between rental partners. Rental partners' competing preferences create difficulties in bargaining.

Second, my theory shows that rental partners' conflicting preferences result in a Nash bargaining game in which the party facing lower compromise costs should compromise to maximize the joint surplus. My empirical analysis supports the theory. I find that, when the difference in compromise costs rises by 0.1 units, the agent facing higher compromise costs is 7.9 percentage points less likely to compromise in the bargaining.

Third, adopting a reduced-form approach that reflects the information in the theory, I measure ex-ante bargaining costs in monetary value. The transaction costs are generated by inefficient bargaining when agents facing lower compromise costs refuse to compromise. Renting-out agents pay an extra 126.5 RMB per mu per year in ex-ante bargaining costs to renting-in agents to allow the renting-in agents to avoid compromising. Renting-in agents' refusal to compromise results in informal contracts. The ex-ante bargaining costs associated with renting-out agents' refusal to compromise is 35.42 RMB per mu per year, paid by the renting-in agents. Inefficient bargaining is a precautionary strategy that reduces ex-post adaptation costs at the expense of ex-ante bargaining costs.

Based on this study's empirical results, I suggest two policy implications. First, provincial governments could develop training programs for intermediary agents who specialize in rural land rentals to facilitate bargaining and coordination. These intermediary agents should work mainly on reducing ex-ante bargaining costs associated with larger-scale rentals and supervise the protection of transferred land property rights. Second, village administrations should provide public goods to eliminate heterogeneity in agricultural conditions across plots to reduce transaction costs associated with larger-scale rentals. Homogeneous agricultural conditions make it possible for renting-out agents who are contract violators temporarily to use abandoned plots along borders before the end of an agreed-on rental tenure without interrupting renting-in agents' post-rental agricultural production, reducing the transaction costs that are associated with location specificity and non-agricultural income shocks.

Appendices

Comparative Statics of Other Parameters in Affecting C^{o*} and C^{in*}

While non-agricultural income shocks drive C^{o*} and C^{in*} in opposite directions, other parameters also affect rental partners' individual preferences in opposite directions. The comparative statics results (see Table 17) show that changes in all the parameters that affect both the renting-out agent's and the renting-in agent's profit maximization could cause the differences between C^{o*} and C^{in*} .

Table 17: Comparative Statics associated with C^{o*} and C^{in*}

Parameters	C^{o*}	C^{in*}
s	$\frac{\partial C^{o*}}{\partial s} < 0$	$\frac{\partial C^{in*}}{\partial s} > 0$
δ	$\frac{\partial C^{o*}}{\partial \delta} > 0$	$\frac{\partial C^{in*}}{\partial \delta} < 0$
r	$\frac{\partial C^{o*}}{\partial r} > 0$	$\frac{\partial C^{in*}}{\partial r} < 0$
N	$\frac{\partial C^{o*}}{\partial N} > 0$	$\frac{\partial C^{in*}}{\partial N} < 0$
L	$\frac{\partial C^{o*}}{\partial L} < 0$	$\frac{\partial C^{in*}}{\partial L} > 0$
$\bar{L}$		$\frac{\partial C^{in*}}{\partial \bar{L}} < 0$
α		$\frac{\partial C^{in*}}{\partial \alpha} > 0$

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