

HETEROGENEOUS CHOICE IN WTP AND WTA FOR LAND RENTAL
ARRANGEMENT IN RURAL CHINA:
CHOICE EXPERIMENT FROM THE FIELD

A Thesis

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ABSTRACT

China's institutional structures regarding land are unique and complex. Private ownership of land is not allowed in China since rural collective organizations own farmland. Farmers however have land use rights, which are divided into contract rights and use rights, to use the land for a certain period. Recent changes to the land laws now permit farmers to rent the use rights from other farmers. As a result, a small sub-population of Chinese farmers are renting use rights (and land) to increase the size and scale of operations.

Land rental arrangements can be organized through newly established 'land transfer centers' or through traditional informal arrangements. An analysis of farmers' economic perspectives towards land transfer is increasingly policy relevant, and the subject matter of this thesis.

This thesis estimates the economic value of farm land rental by using data from 208 farm households across China. In-the-field D-optimal choice experiments and household surveys were conducted from June to December 2018. A choice experiment was used to determine the key factors that motivate farmers to rent out or rent in land. We then estimated the demand and supply for farmland rental according to the results from the choice experiment using conditional and mixed Logit models.

The analysis provides several insights into Chinese land rental markets that are not well understood or documented. First, a strong legal framework surrounding contracts makes farmers more likely to rent land out. Secondly, even without ownership for farmers, China still has a well-functioning farmland rental market where people want more productive land with greater levels of characteristics. It is a validation of the

assumptions from Ricardian rent theory in a completely competitive market. Thirdly, farmers' preferences for land characteristics correspond to their unique geographic environments. Fourthly, the rent price equilibrium revealed by choice experiment is consistent with other studies using different methods and responses to household surveys. Lastly, results suggest, at least in the short term, that the farmland rental market is a renter's market with the supply of transferable land use rights. Consequently, farmers who choose to rent-in land have an advantage over farmers who decide to rent-out land when it comes to price negotiations.

BIOGRAPHICAL SKETCH

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This thesis is dedicated to Professor Calum G. Turvey, my mentor in graduate school.

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CHAPTER 1 Background

1.1 Introduction

Perhaps one of the most constraining factors in China's economic development are those imposed under the reformed collective system that in 1978 allocated small land units to farmers under the household responsibility system. This traditional system issued a "land use right" (LUR) to individuals based on rural residence, and in aggregate amounted to about 1 acre, or 6 Chinese mou, for a family of 6.

It is easily argued that this small allocation of land has been insufficient in driving the economies of scale and size that China requires for food security. With limited resources farmers have neither the incentive nor capital to deploy advanced technologies to increase agriculture productivity. With such a high labor to land ratio per household, technological advances to improve labor efficiency are unnecessary. Even if farmers sought to achieve economies of scale and size by expanding the farming land through renting land, this was restricted by law or required permissions from local cadres and leaders.

However, in recent years, the communist party of China (CPC) has taken action to loosen the attachment of land use rights and permit open transactions between farmers, or through newly established Land transfer centers. Starting in 2015 legislation proposed by the CPC has progressed to the point where upon a thousand of farmers are renting their "production" and "management" rights to a much smaller number of farmers who want to expand to more commercial-sized farming operations that can achieve profitability through gains in economies of scale and size.

It has been argued that the promulgation of new land laws is perhaps the most transformative land policy since the implementation of the household responsibility system in 1978 or even the era of collectivization that started in 1950 (Peng & Turvey, 2015). How long it will take for Chinese agriculture to transform to the economies observed in more developed western nations is unclear, as is the period of time it will take to observe an uptick in agricultural productivity. However, when land bundled into lot sizes of 100 mou- replacing the livelihoods of perhaps 100 rural individuals are rented to a single farmer through the land transfer centers, the revitalization of China agriculture economy will be achieved. Indeed, during the course of this study, our team was introduced to a farmer who in one evening entered into rental arrangements with all but a handful of households in a village of some 250 individual households.

Key to this transformation is the efficiency of land transfer rental agreements, more specifically, the land rental market must be sufficient robust and transparent to establish an equilibrium rental price that is sufficiently high to encourage farmers to lease the land, and sufficient low so that farmers renting the land can do so profitably. The guiding economics here is the Ricardian rent, at which farmers will pay no more than the marginal value production of land (MVP). Complicating this are the hedonic properties of land itself: whether the land has access to irrigation, whether the land is concentrated, where the land can be put to alternative, more profitable use, and even the agency relationship between prospective “landlords” and “tenants”, they can all affect the willingness to pay and willingness to accept a particular rental rate.

In the absence of microeconomic data and production relationship that might permit the economic determination of the MVP of land, an alternative approach is to determine

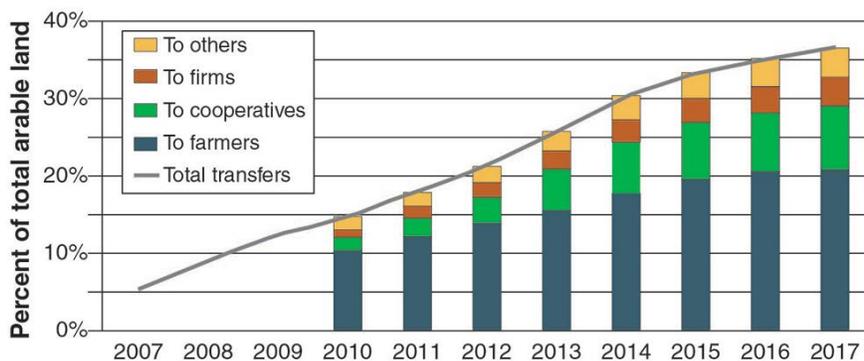
market clearing rental rates using experimental techniques. This is what this thesis investigates. The purpose of this paper is to investigate the factors which motivate farmers to rent out or rent in land, WTA and WTP for agricultural land rental and to determine whether an equilibrium can be established.

1.2 Emergence of land transfer centers

The significant break from custom in formalizing the separation of land transacting right and land use right from ownership meets the huge need of land transfer for farmers. Prior to 2007, LUR granted to farmers were not separable from land ownership, and transactions between LURs were prohibited by Law (Ding, Land policy reform in China: assessment and prospects, 2003). The informal transactions were sometimes common in China, it was done either secretly or with approval from village leaders and councils on an ad hoc basis. The lack of administrative channels for land rental resulted into the deficiencies of land use, social conflicts and land disputes (Ding, Land policy reform in China: assessment and prospects, 2003).

Within the institutional system, the land transfer centers (sometimes referred as “land banks”) provide an exchange between farmers who are willing to transfer their land and farmers who are willing to “receive” such land. Related policies have been promulgated that liberalized farmers’ ability to transact land use right (LUR) through land transfer centers, including renting and mortgaging the LUR to make changes in land institutions.

Figure 1 Agricultural land transfer: the booming rental market in the past ten years¹



In the past ten years, the agricultural land transfer developed fast and are mostly realized by land lease. (See Figure 1 for the booming rental market from 2007 to 2017) In our study, we explore land rental arrangements. The development of land rental has led to more attention on the unmarketable and unexploited LUR, which implies redistribution of wealth, economic power and political influence among rural populations (Binswanger, Deininger, & Fefer, 1995). The current structure of LUR in China was a first step in the de-collectivization of Chinese agriculture. Therefore, complementing an analysis of the factors affecting farmers' decision on land rental and then estimate the economic value of LUR is increasingly interesting and relevant to policy.

¹ Source: Data before 2010 are from chinaaidr.com (2018), 2010~17 data are from Agricultural Development Reports).

1.3 The challenges of land reform

1.3.1 Household Responsibility System

The Household Responsibility System (HRS)² was originally created by peasants' from Xiaogang Village in 1978. Then the central government affirmed the HRS and later widely spread the policy at the national level. HRS has protected the rural collectives' ownership and divided the land for each household to work on agricultural production (Ye, 2015).

Implementation of HRS motivated farmers' productive enthusiasm and promote the development of rural economy. Secondly, it relaxed the productive forces in China's rural areas (Lin, 1992). Thirdly, it increased farmers' income level and thus decreased the rural poverty level.

However, it also led to some problems; one of them is the tremendous fragmentation³ of farmland. The limited agricultural land resource in China was distributed to 231 million households, resulting in average farm size of 0.96 acres per household. Many small farms are scattered in several small and separated plots under the egalitarian principle (Qian, 2000 & Ye, 2015).

Land transfer is one of the most important methods for tackling the problems caused by land fragmentation. For example, the Scale-up Operation (*guomojingying*), refers to taking the lands from peasants and reassigning the land to farmers who plan to increase agricultural productions, is based on that fundamental result of land transfer (Ye, 2015).

² The household responsibility system was a practice in China, where 18 households signed a contract with local cadres. The cadres secretly disturbed the land and allowed farmers to produce by household (Huang, 2011).

³ Land fragmentation, which is defined as the existence of several spatially separate plots of land, which are farmed as single units (Ho, 2005).

1.3.2 Farmland Protection

Following HRS, the implementation of Farmland protection, which was promulgated first by a 1988 Land management law, was another important milestone of the land reform. Urban expansion and infrastructure construction have developed extensively, and the land-based development activities contribute to the continuing economic development (Ye, 2015). The government initiated the farmland protection to stop land appropriation⁴ of farms for urbanization and industrialization.

The main objective of the farmland protection regulation is to meet the food security that China requires through crop production. It ensures the amount of national farmland does not fall below the “red” line of 1.8 billion mu (Ye, 2015).

In this regard, a land use policy entitled ‘Balanced Increase and Decrease of Farmland’ (*zeng jian gua gou*) came into force in 2006, which was achieved by the reclamation of land to compensate for the previous loss in farmland (Ye, 2015). The reclamation in rural areas required obliging farmers to resettle from rural areas to urban cities.

The resulting policies, however, led more problems. First, the reclamation disturbed farmers’ normal lives and affected the agricultural production (Ye, 2015), especially for those who are unwilling to leave the rural areas. More and more people were obligated to leave the land or volunteered to leave the land. Rural-urban migration has been massive developed during the period, a great amount of farmers entered into cities and became workers (“*nominggong*”) to support the process of industrialization and urbanization.

⁴ Land appropriation refers to the rapid trends in urbanization and industrialization requires more land.

The question of “who will till the land” (Zhu & Yang, 2011) challenges the food security of China. The “feminization and greying of agriculture production” means that agriculture is now mainly undertaken by those women and the elderly left behind in the countryside (Ye, 2015). As mentioned previously, land transfer is one of the most important methods for tackling these problems.

1.3.3 Policies on land transfer

New policy innovations on Land transfer, is central to the institutional attempts to tackle farming problems in China. Many anthropologists and sociologists point out disadvantages of land transfer from social impacts. For example, allowing large capital investments in agriculture would harm the development (Chen, 2011). Some researches (Zhao & Tang, 2011) argue that land transfers have harmed farmers’ welfare. Moreover, land grabbing, another way to call “land appropriation”, by capitalization would make peasants ill-informed about the changing markets and especially worse for those peasants without off-farm work because they lost the safety net of earning income. Nonetheless, in terms of these problems, Land transfer is still one of the most important methods for dealing with the fast pace of urbanization and industrialization and answering the question of “who will till the land for China” at this time period from economic perspectives.

1.3.3.1 The strict limitation

The development of land transfer policies is crucial for rural development. The evolution of Land transfer in political terms witnessed the obvious shift from strict prohibition on land transfers to relaxation, and promotion is discussed here (Ye, 2015).

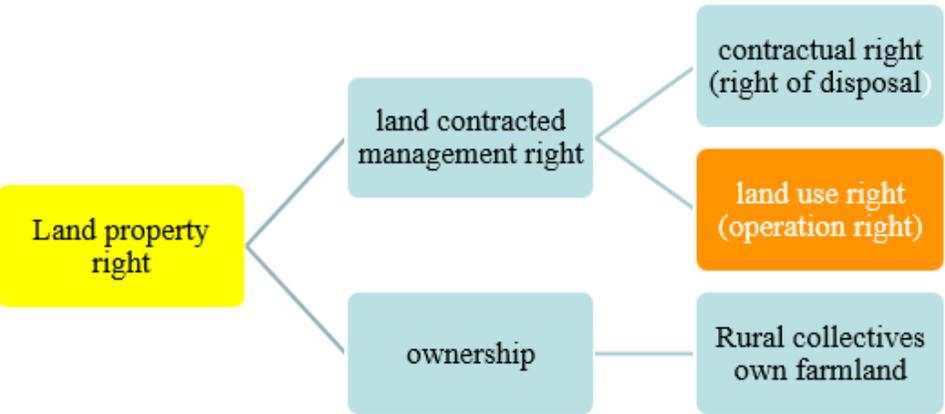
Even if the advantages of land transfer have been informed, this was restricted by law or required permissions from local cadres and leaders. It was strictly forbidden in the early 1980s.

1.3.3.2 The improvements in land transfer policy

Recently, some policy improvement in land transfer policies were made to facilitate the development of the process. The first one is to certify and register land use rights.

The second improvement refers to the three-right separation in the Figure 2: *land property right reform*. It separated the land use/management rights from land contract rights, which is an important amendment reform to the law on land contract. The third improvement is the novelty of the reform, which is based on the splitting and division of land property right. Farmers could keep their contract right unchanged and only transfer the management right when they rent-out their contracted land. Aside from that, they even could use the management right to mortgage for the loan or “invest” the right to exchange the shares in a cooperative.

Figure 2 Land property right: Three rights separation



1.4 Research problems

This thesis will analyze the impact of land transfer in the structure of rural development from an economic perspective. As some researchers mentioned, land transfer is seen as a pivotal aspect of rural reform, which enables the effective flow and optimal allocation of resources, thus contributing to the growth of the rural economy (Ye, 2015). Few studies have successfully determined the demand and supply characteristics for agricultural land.

This thesis explores the presence of land rental and develop a Choice experiment that was implemented quickly, inexpensively and is easily replicable.

The overall objective of this thesis is to investigate the potential effects on the dynamics of farmers' decisions on land transfer in China to examine the demand and supply characteristics for agricultural land in the underdeveloped land market, for example the emergence of land transfer center,

The specific objectives are to:

- a. Investigate the market economic value of Land use rights and identify the attributes of land rental market important to farmers.
- b. Examine the amount of willingness to pay and the willingness to accept and the equilibrium price for the land rental market.
- c. Discover the extent to which land transfer increased or decreased efficiency and equity and then develop the potential development pattern of land transfer under the trade-offs between equality and growth.

1.5 Organization of the thesis

In this chapter, the importance of land rental to farm household, the background, including the concept of land transfer and main changes of land institutions are

discussed. The background literature, referring to the theoretical framework, is provided in the second chapter. The choice experiment design, including the background literature, the economic theory under the methods, and the rules of designing and estimation of model is specified in the third chapter, which refers to the methodological framework. The layout and implementation of field work is outlined in the fourth chapter. The empirical result of choice experiment and descriptive statistics are evaluated in the fifth chapter. A summary and conclusion of this study is specified in the sixth chapter.

CHAPTER 2 Literature review

The purpose of this chapter is to provide economic foundation of land rent. I identified area of prior scholars on interpreting the economics of land and evaluating the economic value of land, which are mainly Ricardian Rent Theory and Hedonic Price Model. I then developed my theoretical model of the economic value of LUR.

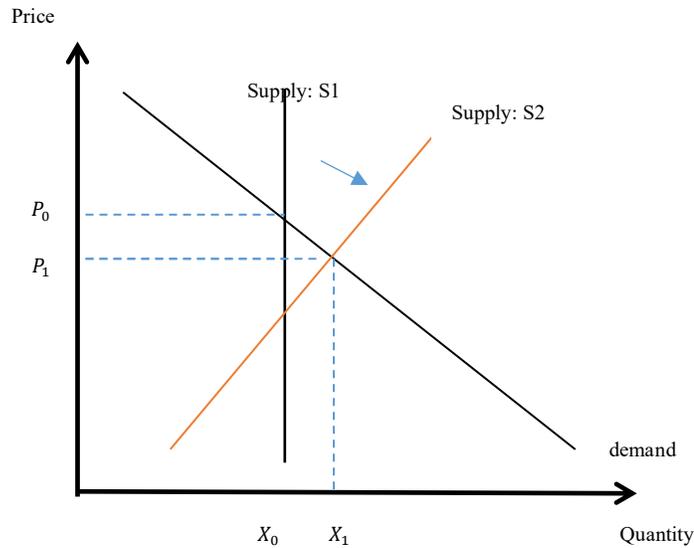
2.1 Ricardian rent theory

According to the objectives of this thesis, it is important to understand the Ricardian rent theory. In terms of rent, Ricardo called the rent as the “*uses of the original and indestructible powers of the soil*” (Ricardo, 1815). Ricardo noted specifically if we land is more fertile, it will have a higher rental value.

2.1.1 The concept of “economic rent”

According to Ricardo (Ricardo, 1815), the concept of “economic rent” is graphically depicted by the standard demand and supply curve. The vertical supply curve (quantity supplied invariant to price) would intersect with demand curve at the amount X_0 . The supply is constant at any price, so the supply line is vertical. In other words, the supply of current units would be inelastic to the current price. For land transfer, the supply curve later would be altered in the long run and adjust to demand conditions and become increasingly elastic.

Figure 3 The Ricardian rent and the "economic rent"



The Ricardian rent theory considered land to be a fixed factor of production, which should be adopted (Ricardo, 1815), however, the intensive factors like land quality should not be the only factor to influence the rent, which seems not practical under contemporary rural rental market in China.

In conclusion, the intensive aspects, site characteristics should be discussed, including land fertility, but also some extensive factors during the process of land transfer, such as the access to irrigation facilities and contract framework surrounding the land transfer.

2.1.2 Extensive margin and intensive margin

We now explore in more depth the economic value of LUR at the intensive and extensive margins. First, LUR held no market value in the Ricardian sense. However, since 2009 policies have been promulgated in a move that essentially coupled the LUR

with production, creating a previously unexploited or unmarketable economic value that can return rents to farmers. Hanley (1910) explains the terms “extensive margin” and “intensive margins” in his paper. The rents from intensive cultivation arose from the intensification of production on the same use of land, while the rents from extensive cultivation arose from allocating resources not only in the same-use (e.g. agriculture) but also into the alternative uses (e.g. factories, residential buildings) (Peng, 2015).

The recent policy changes were motivated to improve agricultural efficiencies at the intensive and extensive margin. On the one hand, they are working to increase productivity in the same use of land at the intensive margins. On the other hand, for example decoupling production rights to the LURs itself, it was a significant move in terms of economies of size and economic growth at the extensive margin. With transactionable land farmers would be more willing to transfer or rent their LUR legally to a third organization or through land transfer centers. Additionally, by targeting the extensive margin with allowances for long-term mortgageable credit, the intent was to increase absorption of rural labor supply in the urbanization process, while improving rural investments and decreasing rural-urban inequality.

First, we define the production function in terms of variable input x and capital k , and profit maximizing optimum at y^* . The production elasticities, δ_x, δ_k . The production response is given by

$$y = \alpha x^{\delta_x} k^{\delta_k} \quad 1)$$

At the intensive margin, in order to achieve the optimality, the farmer seeks to change the levels of variable and quasi-fixed assets in the following way.

$$y^* = y + \Delta y = \alpha (x + \Delta x)^{\delta_x} (k + \Delta k)^{\delta_k} \quad 2)$$

The cash equivalent, C is required if you want to improve or change your levels of variables and quasi-fixed assets. $V(v_x, v_k)$ is the estimated cash or cost for per unit variable input or capital

$$C = v_x \Delta x + v_k \Delta k \quad 3)$$

At the extensive margin, the intercept α captures the capacity of the farm to achieve scale and size economies from the fixed resources available (e.g. land and non-moveable investment such as access to irrigation). The greater the capacity, the greater the value of α . The production response is specified as

$$y^* = (\alpha + \Delta\alpha)x^{\delta_x}k^{\delta_k} \quad 4)$$

Finally, we combine the 2) and 4) to get the simultaneous changes at both extensive margins and intensive margins, then we specify the production response:

$$y^{**} = (\alpha + \Delta\alpha)(x + \Delta x)^{\delta_x}(k + \Delta k)^{\delta_k} \quad 5)$$

The budget constraint, for both extensive margins and intensive margins can be depicted as the

$$C^* = v_x \Delta x + v_k \Delta k + v_\alpha \Delta\alpha \quad 6)$$

The third change is the nature of production via changes to the production elasticities. For example, the exchange of corn and wheat to kiwi as it observed in our fields, like Sichuan Province, it would increase the production via the increase of production elasticities, the production response is that

$$y = \alpha x^{(\delta_x + \Delta\delta_x)}k^{(\delta_k + \Delta\delta_k)} \quad 7)$$

Then we specify the economic value of LUR, which is determined by the Ricardian notion of economic rents that the value is placed on the optimal alternative. Assuming the value of the LUR is treated as perpetuity, we depicted the value

$$v = \frac{(\alpha + \Delta\alpha)(x + \Delta x)^{(\delta_x + \Delta\delta_x)}(k + \Delta k)^{(\delta_k + \Delta\delta_k)} - (v_x(x + \Delta x) + v_k(k + \Delta k) + v_\alpha \Delta\alpha)}{r} \quad 8)$$

2.2 Valuation techniques

In general, there are two valuation approaches in the environment economics, revealed preference method and state preference method (Kandari & Abdullah, 1994). The following paragraphs outline the approaches and these models, such as market price model, hedonic price model (HPM).

The first approach, revealed preference method, is more preferred in the literature. Within this approach, Hedonic price model (HPM) is the prominent one regarding the valuation of land, especially housing market. The land value depends on different attributes or characteristics (Stephen, 2002).

$$P(Z_i) = P(Z_{i,attribute\ 1}, Z_{i,attribute\ 2}, \dots, Z_{i,attribute\ n}) \quad 9)$$

The marginal impact on price, $P(Z_i)$ of any Z_i can be estimated from this function. It is also associated with a production function including agricultural outputs, which is consistent with the production function derived from Ricardian rent theory. Land is treated as a differentiated factor of production and the implicit prices of constituent characteristics are identified using the Hedonic price method of Rosen (1974).

It includes attributes related to agricultural production, and non-agricultural rent generating opportunities.

The basic Hedonic regression is basically regression of rent or house value against characteristics of the unit that determine that rent or value (Stephen, 2002).

$$R = f(S, N, L, C) \quad 10)$$

where R = rent (amount to money)

S= structural characteristics,

N= neighborhood characteristics;

L=location within the market;

C= contract conditions or characteristics,

In some other studies (Elad, Clifton, & Epperson, 1994); (Miranowski & Hammes, 1984); (Palmquist, 1989); (Shonkwiler & Reynolds, 1986); (Vitaliano & Hill, 1994), Hedonic price model was adopted in different research questions.

Additionally, HPM has been employed by Miranowski and Hammes to determine the implicit prices for soil characteristics in Iowa Brown (Miranowski & Hammes, 1984). There are also some studies measuring the behavior impact on productivity in land value. For example, Ervin and Mill have used the hedonic model to measure the impact of soil erosion on farmland productivity (Ervin & Mill, 1985). Palmquist and Danielson have employed the model to measure the value of erosion control and drainage on farmland productivity (Palmquist, 1989). Mendelsohn et al., Dinar et al. have used the HPM to measure the impact of climate on agricultural productivity in land value in the United States, India and Brazil, respectively (Mendelsohn, Nordhaus, & Shaw, 1994; Dinar, et al., 1998; Maddison, 2000).

However, some literature mentioned that the hedonic model studies requires detailed and huge amount of data on individual land parcels (Chau & Chin, 2002). It relies on the assumption of a freely functioning and efficient property market. Obviously, although the land rental market in China is still an incomplete market and land is unmarketable, we could take the main idea of that land are made up of different bundles

of attributes or characteristics from Hedonic price model and combine the production function with the “economic rent” from Ricardian Rent theory

The second approach, state preference method, adopts questionnaire-based methods that seeks to discover individuals’ preferences, which is practical and increasingly popular in marketing and health policy sides (Bernie & Viramontes, 1994). An important feature of State preference method is that they can reveal values that are not revealed using other methods and uncover non-market products’ value, which is better fit for China rural land rental market. The most well-known approach under this category is Contingent Valuation Method (CVM) and Choice modeling among of the category is also becoming increasingly popular.

According to Khantachavana and Turvey (Khantachavana, 2013), they follow closely in logic with the Contingent valuation method for pricing non-market goods, the transaction value of land use right in rural China, which sets good example for this thesis to adopt state preference method.

Following their paper, according to Ricardian rent theory, I use the production function to evaluate the economic value of LUR and combine the main idea from Hedonic price model to investigate the factors that would affect farmers’ intention and then lead to these price changes. By state preference method using household survey, I tried to validate the results from Contingent valuation methods- Choice experiment.

2.3 Factors that affect farmers’ intention

In terms of transacting land, Khantachavana et al. (2012), find a fairly significant spread between the willingness to sell and buy by prices of transactable land, suggesting that many farmers will need significant economic incentives to transfer their rights. The

economic incentives refer to the intensive factors and extensive factors that affect farmers' intention to rent-in or rent-out. The following paragraphs talk about the influencing factors on farmers' decision on land transfer and then examine the relationship between demand and supply in land rental market.

2.3.1 Characteristics of land

First, the intensive property of land, the land characteristics, is crucial for farmers, especially for farmers who decide to rent-in. According to Khantachavana and Turvey (2013), farmers who grow high-value (profitable) crops are more likely to rent LUR at higher price and stay in farm. On the other hands, the higher profits from high-value crop cultivation is also due to the higher land quality. In sum. Land quality affects the land profitability, the higher land quality increasing the output or reducing the production risk to some extent.

Moreover, in terms of the topographic characteristic, if the terrain is flat, it is easier to rent-out land at a fair price. If the land is fragmented, it is more difficult (Chen, 2011). The rate of fragmentation remains high in China under the current principles of land distribution within villages, landholdings in suburban areas are more fragmented.

However, according to some studies (Dijk, 2003), land fragmentation has positive effects on increasing land productivity. First, when farmland of one farm is divided into a number of parcels with different locations, it is expected that the risk would be reduced and varied. Aside from that, fragmentation means smaller size of land, which refers to that land parcels are distributed to the farm and it would be easier to achieve the well-protected land tenure security because of the samller size. From a strategic economic

perspective, land use fragmentation has negative impact on income, thus affecting farmers' decisions on that.

2.3.2 Formal contracting framework

In terms of formal platform in land transfer, we should talk about the complete property right, the contractual arrangement, terms of contract and the participation of land transfer center. Their formality in general are aimed at minimizing the transaction cost and maximize the profit for lessors and lessees (Zhang, Liu, & Cai, 2018).

2.3.2.1 Contractual arrangement

The contract arrangement and term of contract, which could be considered as the one of extensive property of land, is a signal of market development and security of land transaction, which makes the land transfer more transparent and reduces the land conflict (Noev, 2008). Otherwise, the informal agreements or lack of contracting, together with unauthorized land use, are signals of institutional constraints and incomplete market.

However, some researches (Allen & Lueck, 1992) argue that the informal contracts are signals of complete and perfect competitive market because verbal and simple written contracts are better fit for stable social environments. Moreover, some researches (Noev, 2008) provided a rational explanation towards the persistence of informal land rental contracts, providing that when contracts are limited to cases that satisfy incentive compatibility and voluntary participation constraints, the transaction cost from formal contracting is higher when compared with informal verbal contracting, thus the formal contracts seem unnecessary.

On the other hand, though the transaction costs from formal contract would be a high pressure for rent-out and rent-in, the formal contracts improve the efficiency of resource allocation, especially when the other market are incomplete.

2.3.2.2 Term of contract

The second issue about contract is the terms of contract. According to Tan et al., (Tan, Heerink, & Qu, 2006), short-term contracts or uncertainty over the contracts can lower the household's expected returns to its investment and reduce the optimal level of investment.

By contract, farmers with longer term of contract will be more likely to invest in land-saving, productivity-enhancing activities such as irrigation, drainage and terracing. (Yan, 2013). Farmers will have more incentive and capital to convert land to higher-value uses; or maintain soil fertility through practices such as the application of organic fertilizers for the long-term contract. It is easily argued that the return to these types of investment are usually insufficient to pay back the initial outlay in a single year but are spread over a longer period. (Yan, 2013).

Same as the concern of the tenures of land property right, the current round of land tenure will be extended for a further 30 years in order to protect the stability and consistency of rural lands upon expire in 2023 and now keep valid until 2053. The purpose of extending the tenure or having longer term of contract is to increase land use security so that land becomes a life safeguard, at least for a period in farmers' minds (Tan, Heerink, & Qu, 2006).

2.3.2.3 Land transfer center

The third issue about contract is the land transfer center. One of the goals from the participation of land transfer center is to reduce the transaction costs.

The main responsibilities for land transfer center are to collect information on land transfer, such as the amount to be supplied for transfer and the amount to be demanded, to release the information in a timely manner, to organize the public bidding and promote the marketization of land use right transfer. The other roles including coordinating the procedures, assisting contractual matters, and adjusting the transaction structures periodically. After the transaction, they should work on assisting in mediating contractual disputes, protecting landowners, contractors and operators' right, reviewing, monitoring and evaluation of these transactions. (China's urbanization and land: a framework for reform, 2015)

2.3.3 The property rights

The property right of land is considered as the combination of intensive and extensive property of land transfer. Insecure land rights and the fact that renting-out may be a signal to take land away from them (Jin & Deininger, 2009).

Moreover, according to some researchers (Benjamin & Brandt, 2002), this kind of insecurity could be remedied by one way which is to prove ownership which is realized by the land certificate. On the other hand, it could motivate farmer to conduct more rental transactions, possibly at a lower price; the other way which is to have the guarantee (Jin & Deininger, 2009).

2.3.4 Characteristics of farmers

In order to estimate the farmers' decision on land transfer, it is necessary to focus on the proximate agents of land production since the focus on households will play an important role on studying the equity effects of the land rental market development. According to Tan et al. (Tan, Heerink, & Qu, 2006), the participants of land transfer and their characteristics are important for both rent-out and rent-in.

First, increasing farmers' income is not only the necessity of land circulation, but also the prerequisite and foundation of free circulation of rural land. Jin and Deininger argued that household wealth and access to non-agricultural employment opportunities have a positive impact on the supply of land to rental market, while they also suggested that families with a relatively large number of migrant workers tend to rent out land and hence this is the main reasons for rural land transfer (Jin & Deininger, 2014).

Furthermore, the characteristics of farm households such as off-farm employment, educational level, and age also have impacted land leases (Teklu, 2003). Off-farm employments is expected to contribute to land consolidation, then the land transfer (Tan, Heerink, & Qu, 2006). In some cases, farm households involved in off-farm employment outside the village have more incentives to rent-out their land to other households in the same village.

The variable age and education level are expected to affect the marginal productivity of land, and hence rental activities (Mathijs & Vranken, 2001). In terms of age, younger households are expected to be more dynamic and entrepreneurial. However, on the other hand, some literatures indicated that experience will increase with age, which means

older people could produce higher marginal product and hence more incentive and capital to rent-in land.

In terms of education, it is often measured as years of schooling. The longer length of years of schooling leads to an increase of management capacity, so they are more willing to rent-in land. On the other hand, when above a certain educational level, rural people may get access to better off-farm opportunities, hence reducing their labor allocation to farming. Farmers are more willing to rent-out land since they are more inclined to shift to off-farm employment.

Aside from that, the social relationship of respondents would affect farmers' decisions on land transfer. Khantachavana (2013) found having a household member with a government job or a job in a state-owned enterprise could lead to a greater access to credit or productive inputs' sources. Moreover, Ding (2003) also mentioned that land policy reforms in China would lead to some negative consequences such as government corruption.

2.3.5 Access to insurance and credit

The extensive property of land transfer is the credit or collateral product. Schumpeter (Schumpeter, 1947) argued that though economic development is driven by adaptive response to macro-driven factors, such as population and global growth, the creative response which arises largely independently of these to do or create something that is outside of the conventional range of existing practice, credit market and insurance as among the innovations.

For some transition economies, financial institutions often refused the request which takes land as collateral. The imperfectly defined property rights of land, the thin and prohibited land market prevent these financial institutions from taking over land in case of default (Swinnen, 1994). In sum, some researches assume that access to loans depends on the amount of land they owned and thus the access to loans affects people's preference for land transfer (Mukesh & Ashok, 1990).

In conclusion, a few studies have successfully determined the demand characteristics for agricultural land, especially in China's immature market. First, the contract legal framework (land transfer center, receiving/paying guarantee payment, longer fixed terms of contract years) would affect farmers' decisions on land transfer. Secondly, according to Hedonic Price Model and Ricardian Rent theory, the characteristics of land affect farmers' decisions on land rent and then lead to changes in LUR (Fragmentation, irrigation facilities, land quality, land profitability, distance to village). The objective of this thesis is to investigate the economics of land rental and decide whether an equilibrium would be achieved by the intersection points of marginal utility.

As in the latter studies, we draw on the results of a theoretical model of land market to guide us to tackle the objectives of this thesis by the approaches used in previous analysis, the economic theory in land valuation, and the selection of proxy measures for land "transfer" behavior.

CHAPTER 3 Choice experiment

3.1 Introduction

Contingent valuation refers to observed choices that are contingent on scenarios posed in the experiment. The central importance of CV in welfare economics and non-market valuations can be illustrated by over thousands of papers and studies referenced in Carson on environmental valuation (Carson & Hanemann, 2005). The wide range of policy decisions (Griffiths, Spilles, & Bonkowski, 2012) adopts CV to look at specific policy.

The first research proposal of CV in the field was that Bowen (Bowen, 1943) and Ciriacy Wantrup (Ciriacy, 1947) proposed the use of specially structured public opinions survey to value what Bowen called “social goods” and Ciriacy-Wantrup called “collective, extra-market goods”.

The first application of CV in the literature was Davis’s 1963 Harvard dissertation which used surveys to estimate the value hunters and tourists place on a particular wilderness area to “approximate a market”. They provided alternative kinds of areas and facilities for the public, and then simulate market bidding behavior.

Discrete choice experiment (DCE) for CV became popular when Hanemann (1984), estimated Hicksian welfare measures based on McFadden’s random utility model and indirect utility function (McFadden, 1973). Researchers start to implement the discrete choice experiment formats involving multiple choice and questions to achieve more information.

DCE is used to evaluate the choices from an elicitation format characterized by the specific characteristics of the good. The literature about choice experiment in land

contexts is limited, although CE has been widely applied in transportation, health industry and marketing. Khantachavana and Turvey (Khantachavana, 2013) used multiple bound discrete choice model in land properties.

In other areas, it includes preference elicitations on medical products (Coast & Horrocks, 2007); (King, et al., 2007); (Lancaster & Lmbens, 1996), and preferences of health personnel (Scott, 1999).

DCE has frequently been applied to high-income countries' researches. Despite wide interest in DCE approach to economic problems, several issues have seen raised in the literature.

First, respondents are required to meet large number of choices sets, they may have difficulty in learning and even feel tired of it, which leads to apparently irrational choices (Tversky & Shafir, 1992). Additionally, the statistical problems and the correlation between respondents when one respondent handle repeated choice sets needs to be considered. Deciding which kind of properly models needs to be considered (Adamowicz, Louviere, & Williams, 1994).

The choice of attributes, the level chosen to represent them, and the way in which choices are displayed to respondent, charts or images, would may influence the effectiveness of estimating consumers' utilities.

Though it has some shortcomings, the large demand from policy makers for valuing changes in attributes induce the quickly growing number of studies using DCE (Hanley, Robert, & Vic , 1998). With an objective of identifying the attributes of China's land rental market, I adopt the DCE method. The combinations of attributes would provide

the insight towards the trade-off relationship. It does a great job in measuring the marginal value of changes in various characteristics of land.

3.2 Random Utility Theory

According to Luce (1959), choice experiments adopt a theoretical framework of Random Utility Model, which relies on the assumption of economic rationality and utility maximization.

Respondents are faced with a series of alternatives with different attributes and levels. Then they are asked to choose which is their most preferred. In stating a preference, the individual is assumed to choose the alternative that yields his highest utility. The utility yielded associates with its composing attributes and attribute levels (Lancaster & Lmbens, 1996). The Lancaster utility function is specified as

$$U_{iq} = X_i\beta_i + \varepsilon_{iq}, \quad 1)$$

X_i: A vector of attributes for the i_{th} alternative

β_i: The marginal utility of each attribute to the utility associated with the i_{th} alternative.

ε_{iq}: The error terms

According to Lancaster (1996), this premise of utility maximization could work as an alternative to the profit maximization when applied to non-market producers, such as rental land in China.

The respondent is expected to choose land alternative A over B if $U_A > U_B$, where U represents the indirect utility from given land alternative, X represents the attribute of land alternatives.

3.3 Designing experiment

In this thesis research, we adopted the computer-generated D-optimality for designing the discrete choice experiment. D-optimality refers to containing the best subset of all possible experiment which includes local D-optimal and Bayesian D-optimal design by JMP, a specialized computer program. The D-optimal design allows the adoption of discrete values for more than two qualitative factors (Eriksson, Johansson, Kettaneh-Wold, Wikstrom, & Wold, 2000). It also works in reducing the number of experiments compared with other classical designs. Moreover, it could fit into special regression models.

Local D-optimal designs consider the prior of the mean (which foresees the direction of each attributes after literature review and expert consultation) but does not include any information from a prior covariance matrix (Huber & Zwerina, 1996).

In terms of Bayesian D-optimality, we denote the distribution for the parameter vector β by $\pi(\beta)$ and use the following Bayesian D-optimality criterion (Sandor & Wedal, 2001):

$$D = \log\left(\int_{R^p} [\det\{I^{-1}(X, \beta)\}]^{\frac{1}{p}} \pi(\beta) d\beta\right) \quad 2)$$

where p is the number of parameters in β .

The prior distribution is the prior beliefs about the parameters. We put all weight on the single value for the parameter vector, $\tilde{\beta}$.

Then the criterion could be simplified to the following:

$$D = \log[\det\{I^{-1}(X, \tilde{\beta})\}]^{\frac{1}{p}} \quad 3)$$

Then we suppose $\tilde{\beta} = 0_p$, the locally D-optimal design is generated.

Aside from the criteria to conduct the optimal design, this thesis considers whether it is practical, which leads us to consider partial profile designs because it can decrease the difficulty for respondents to compare among more than six attributes.

JMP uses a two-stage design algorithm. The first step is for the constant attributes in each choice set, which employs an attribute balance approach.

The second step is for non-constant attributes using Bayesian D-optimality (JMP technical Handbook). The levels are generated using a coordinate-exchange algorithm and evaluated until the Bayesian D-optimality criterion is optimized (Gotwalt, Jones, & Steinberg, 2009).

To construct the choice sets in this thesis, we specified D-Optimality criterion based on calculating the determinant of variance-covariance matrix of the parameters from the logit model.

Based on the experimental design we needed at least $(28-10+1)$ 19 parameters to estimate⁵. According to computer-measured optimal sample sizes, we should have a sample of at least 81 respondents. Then we elected a protocol with two alternatives per choice set to decrease farmers' difficulty, and with each respondent responding to six choice sets to achieve more observations.

After careful literature review, experts' consulting and farmers' opinions, we came up with ten attributes for the choice experiment, separately for rent-in and rent-out. We grouped the respondents into ten equal numbers. Each respondent needs to answer six choice sets.

⁵ $(\#parameter=\#levels-\#attributes + 1)$, S is the number of choice tasks presented to each respondent (6, in our case), J is the number of alternatives per choice task (3 in our case), and k is the largest number of levels of any of the attributes (6, for rent).

We adjust to the partial profile design, allowing six attributes among the ten to vary within the choice sets, which is aimed to decrease farmers' cognitive difficulty and attempt to avoid the response fatigue.

As shown in *Table 1* and *Table 2*, we define the separate attributes and corresponding levels for rent-in and rent-out. Then the examples of first-round card to be presented for rent-in and rent-out are shown in *Table 3* and *Table 4*, which were used in the first round of experiments I May/June 2018. The cards used in second-round experiments are shown in *Table 5* and *Table 6*.

Table 2. Attributes and levels of attributes: rent-out

Attributes	Meaning	Levels
Rent	You should pay to farmers who rent out the land every year (yuan/mu/year)	500 RMB, 600 RMB, 700 RMB, 800 RMB, 900 RMB, 1000 RMB (range from 500 RMB -1000 RMB, marginal increase by 100 RMB)
Guarantee payment	Financial commitments that require you pay money to make sure you would not change the land function and protect the land rights.	You need to pay or you do not need to pay
Land fragmentation	Land which rent in is fragmented, piece or the whole block	Fragmented or Concentrated
Terms of the years	The Duration of the contract (year)	1 year, 3 year, 5 year, 7 year
Use land revenue right (contract) to secure the loan		Yes or No
Land transfer center	The participation of land transfer center	by land transfer center or not by land transfer center
Irrigation facilities	whether the rent-in land has irrigation or not	Yes or No
The distance from village	The rent-out land is far or near your living place.	Far or Close
Land quality	Soil quality, such as erosion	low, middle, high
Land profitability	It depends on the land function and the degree of change your land function:	low, middle, high

Table 1. Attributes and levels of attributes: rent-in

Attributes	Meaning	Levels
Rent	You should pay to farmers who rent out the land every year (yuan/mu/year)	500 RMB, 600 RMB, 700 RMB, 800 RMB, 900 RMB, 1000 RMB (range from 500-1000, marginal increase by 100)
Guarantee payment	Financial commitments that require you pay money to make sure you would not change the land function and protect the land rights.	You need to pay or you do not need to pay
Land fragmentation	Land which rent in is fragmented, piece or the whole block	Fragmented or Concentrated
Land size	The land size of rent-in land (mu)	25 mu , 50 mu, 100 mu, 150 mu, 200mu
Terms of the years	The Duration of the contract (year)	1 year, 3 year, 5 year, 7 year
I transfer method	Your land is transfer by which method	by land transfer center or not by land transfer center
Irrigation facilities	whether the rent-in land has irrigation or not	Yes or No
The distance from village	The rent-out land is far or near your living place.	Far or Close
Land quality	Soil quality, such as erosion	low, middle, high
Land profitability	It depends on the land function and the degree of change your land function:	low, middle, high

Table 4 Choice experiment card: rent-out

	Land 1	Land 2
Rent/year	\$ 500	\$ 800
Guarantee payment	No	Yes
Term of years	3	7
Fragmented	Yes	Yes
Use the contract to borrow against the collateral	Yes	Yes
Distance to village	Far	Near
Institution	Land transfer center	Not by land transfer center
Irrigation	No	Yes
Land quality	High	Middle
Profitability	Low	Low
choose		
How certain are you of the choice you made in the set?	1-2-3-4-5	

Table 3 Choice experiment card: rent-in

	Land 1	Land 2
Rent/year	\$ 500	\$ 800
Guarantee payment	No	Yes
Term of years	3	7
Fragmented	Yes	Yes
Land size	Yes	Yes
Distance to village	Far	Near
Institution	Land transfer center	Not by land transfer center
Irrigation	No	Yes
Land quality	High	Middle
Profitability	Low	Low
choose		
How certain are you of the choice you made in the set?	1-2-3-4-5	

Table 5 Choice experiment Card (second-run): rent-out

	Land 1	Land 2	Land 3		
Rent	500 	700 	1000 		
Guarantee payment	Yes 	No	Yes 		
Fragmentation	Concentrated 	Fragmented 	Concentrated 		
Terms of contract	5 	5 	5 		
Right as collateral	Yes 	No	Yes 		
Institution	No	Land transfer center 	No		
Irrigation	Yes 	Yes 	Yes 		
Distance to village	Far 	100 m 	100 m 		
Land fertility	Middle 	Middle 	Middle 		
Land profitability	Low 	High 	Middle 		
Choice					
Degree of certainty	1	2	3	4	5

Table 6 Choice experiment (second-run): rent-in

	Land 1	Land 2	Land 3		
Rent	800	900	500		
					
Guarantee payment	Yes	No	Yes		
					
Fragmentation	Concentrated	Concentrated	Concentrated		
					
Lot size	25	25	25		
					
Terms of contract	1	5	3		
					
Institution	Land transfer center	Private	Land transfer center		
					
Irrigation	Yes	No	Yes		
					
Distance to village	Far	Near	Far		
					
Land fertility	Middle	Middle	Middle		
					
Land profitability	High	High	High		
					
Choice					
Degree of certainty	1	2	3	4	5

CHAPTER 4 Implementation

The key components to implementing an in-the-field choice experiment include a). Site selection, b). Sample selection, and c). Data collection strategies.

This chapter provides a description of the sample sites and the development of collection instruments, including a separate survey that was included in the protocol, and in addition to the choice experiment itself.

4.1 Sample

Ultimately, data were collected in two waves in corn, wheat and rice areas across 5 provinces in China. The data collection framework is provided in *Table 7*. The first wave was in May and June 2018 in Shandong, Sichuan and Shaanxi provinces with choice (and related survey) responses from 300 farmers. This was a D-optimal, 10-block, 2-choice, 6-cards per farmer effort. The total number of observation points are 1800 ($10 \times 2 \times 6 \times 15$).

The second wave, conducted in Jiangsu and Henan, was a variant of the first but with an efficient Bayesian design to eliminate irrelevant alternatives. This second experiment included images, and was a 3-block, 3-choices per card, and 9 cards per farmer setup. In detail, the choice data for rent-in were collected from 54 farmers, for rent-out were 54 farmers, and total are 108 farmers. Farmers were randomly assigned to a block of choice sets and shown each choice sets in that block, one set at a time. Each farmer had to choose from six different choice cards with two alternatives. The total number of observation points for respectively rent in and rent out was 1458 ($3 \times 9 \times 54$).

Figure 4 Block design for two rounds for separate rent-in or rent-out

	First round	Second round
Blocks	10	3
Choice scenarios	6	9
Alternative	2	3
Total respondent	150	54
Observation	1800	1458

Figure 5 Site map implementation



Table 7 Implementation framework

Province	County	Number of Surveys	of Rent in	Rent out
Shandong	Anjiazhuang, Xiaozhi	113	54	59
Sichuan	Tuanjie, kaiquan, zhongxiang, zhujia, longxin	110	55	55
Shaanxi	Biaojiao, Cuijiaotou, Shuigou, Nanzhai	100	50	50
Jiangsu		54	27	27
Henan		54	27	27

4.2 Survey design

The choice experiment was accompanied by an extensive survey in the first round and a shorter abbreviated survey in the second round. These are provided in both English and Chinese in the appendix to this thesis

First, we included the demographic data collection, such as gender, education, and other farmers' characteristics. Second, we asked several questions about farm attributes and production factors, such as years of farming, farm size. The profitability factors, such as farm income and expected return from farm investment could be considered as the major influence of land values, as discussed in previous literature (Gloy, Hurt, & Dobbins, 2011; Breffle, Morey, & Lodder, 1998; Salois, Moss, & Erickson, 2010; Khantachavana, 2013). Questions about Debt, Credit and Liquidity, included property rights and whether the farm real estate could be used as collateral for farm mortgages, were also put forward in the survey. Other variables of interest, such as business climate were also discussed in the survey. In addition, the political information, for example, whether a household member worked for a village leader, village committee or state government, county government, state enterprise, were queried. (See *Table 8*: Survey variables: farm characteristics).

Table 8 Survey variables: farmers' characteristics

Farm characteristics	unit
Gender	0=female, 1=male
Are you the primary decision maker in agricultural affairs	0=no, 1=yes
Do any household members work for village leader, village committee, state government, county government, state enterprise, and RCC or banks)	0=no, 1=yes
What is your education level	1=never Went to School 2=at least primary school 3=at least middle school , 4=at least high school , 5=some professional university or college, 6=completed College or University
In general, how would you describe the current agricultural business in your area compared to last year	1=getting worse, 2=about the same,3=getting better
The top five crops you have grown in the past 12 months from the most valuable to the least valuable	crops
Relative to other farmers in my village, my farming skills are better	1=Strongly Disagree, 2=Moderately Disagree , 3=Agree, 4=Moderately Agree, 5=Strongly Agree
Age	number
Including yourself how many people live in this house	number
How many members of your household are primarily involved in agricultural work	number
How many members of your household earn off-farm wages	number
How many years have you been farming	number
What is the total size of your household farm (Mu, allocated Land Use rights, excluding land rented in)	mu
How much land do you rent in for agricultural use (total Mu rented)	mu
Farm income	yuan
Off-farm income	yuan
Total income	yuan
Productive expenditure	yuan
Household Consumption expenditures (food, clothes, health, education, etc.)	yuan
Other expenditures (e.g. car, house, vacation travel)	yuan
Gross Incomes minus Expenditures	yuan

Second, a part of survey was dedicated to understanding respondents' risk aversion and prudence. A risk aversion score was calculated based on farmers' willingness to take certain risks. For example, in the survey form, farmers were asked to identify their willingness to take risk with new technologies or new management practices. In addition, famers should indicate the importance of risk management on their farm and how they dealt with different risk management options. The prudence score is based on their attitudes of precautionary savings and attitudes towards importance of saving. The five-level Likert scale is a common and easy way to encourage people to indicate their preferences. Higher scores would indicate the respondent strongly agrees with a statement that refers to risk aversion or prudence. (See *Table 9* Survey variables: farm risk attitudes)

Table 9. Survey variables: farm risk attitudes

Sources of Risk and Risk Perceptions	Unit
I am willing to accepting greater production risks to increase the chance of higher profits is important to me	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I am willing to taking risks with new agricultural technologies (mechanical or management practices or input use) before I see good results on other farms	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I am willing to taking risks with new management practices before I see good results in other farms	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I am willing to diversifying my crop (including livestock) mix in order to reduce risk	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I am willing to having different fields or farms at different locations (geographic diversification) in order to reduce risk	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I am willing to growing more risky crops if I had (or have) greater access to irrigation	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I am more willing to selling my agricultural products over a period of time than at harvest in order to reduce market price risk (diversified marketing)	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I am willing to making some non-farm investments in new business, or financial assets like stocks and bonds in order to diversify household income.	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I am willing to ACCEPT more risk in all aspects of life relative to my peers (other farmers that you know)	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I am willing to taking more risks in all aspects of life than my peers.	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
Precautionary savings	
I save in case my house needs repair	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I save in case my automobile (e.g. car, motorcycle, and tractor) breaks down.	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I save in case I cannot repay a loan from earnings.	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I save for unexpected medical emergency	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I save in case I lose my job	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I save for unanticipated crop loss.	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
In your opinion, do you think saving is important?	1=Strongly unimportant, 2=Moderately unimportant, 3=important, 4=Moderately important, 5=Strongly important
What proportion of Household income (define income here as revenues minus productive expenses minus consumption and other non-productive expenditures) are you able to save in a year	1=none, 2=less than 5%, 3=3%-5%, 4=more than 10%

The third part of the survey included specific questions towards the situation of rent-in, rent-out, (or neither) separately. It was divided into four parts, the general part, and three sub-divisions. (See *Table 10* Survey variables: Land Use Right; *Table 11* Survey variables: rent-in; *Table 12* Survey variables: rent-out and *Table 13* Survey variables: (neither rent-out nor rent-in).

The general part is to solicit out the information of people's perspectives towards the changes of land policy, including some innovations as the emergence of "Three right separation", "Land use right certification", and "Land bank". From the second part to fourth part, it targeted separately for different groups.

Among the third part, the first goal was to use the state preference method to compare and check the results from choice experiment, which refers to people's preference towards each attribute used in the CE on 5-point Likert scale. The second goal is to specifically obtain information about people's motives, understanding and preference towards land rental by more comprehensive and detailed information.

Table 10 Survey variables: Land Use Right

Question	Answer
To what extent you know about land transfer center and land bank	1= I have never heard of a Land Transfer Center (or Land Bank); 2= I am aware of Land Transfer Centers but am not sure of its purpose; 3= I am very familiar with Land Transfer Centers; 4= I have had personal contact with a Land Transfer Center
How did you learn about land transfer center and land banks?	1= The Land Transfer Center contacted me with information; 2=My financial institution (RCC or bank) informed me; 3= The village leader informed me and other villagers; 4= Government provided information; 5= I was told of Land Transfer Centers by a friend or relative; 6=I saw information about Land Transfer Centers from public media such as television or the internet
To what extent you know about land reform, such as separation of three land right	1= I have never heard of and not interested in it. 2=I am aware of land reform, such as separation of three right of land, but am not sure of its purpose. 3= I am very familiar with the whole process, such as N0.1 document.
What's your opinion towards the 30 years lengthening the term of land contract under the CPC 5 - year plan?	1= Positive; 2-negative; 3-not familiar with that
Are you willing to or continue to do land transfer during the following five years If yes please indicate transfer out or transfer in	1=yes; 0=no 1=transfer out; 2= transfer in
If you plan to transfer in or out, how long do you prefer terms of your circulation contract of land	1= Less than one year 2=one year to three 3=more than three year
If you plan to transfer in or out, whom do you prefer to transfer	1= Relatives or Friends by individual or private contact; 2= Farmer market, collective organizations or corporations by individual or private contact; 3= Farmer market, collective organizations or corporations by collective organizations; 4= Formal land institutions (such as Land Bank, Land transfer center); 5=others
Describe the degree of agricultural modernization in your contracted land Have you used your land contracting rights to secure a loan with a local land transfer center/land bank or RCC/bank?	1= totally by hand 2=less 3=more 4=totally modernization 1=yes; 0=no
How do you think the difficulty of securing the loan	1=not clearly because no need 2=easy 3=difficult 4=impossible 5=others
Did you buy the crop insurance	1=yes; 0=no

Table 11 Survey variables: Land Use Right (continued)

<p>Have you ever purchased other types of insurance (for example, life insurance, fire insurance, automobile insurance) If yes, what kind of insurance</p>	<p>1=yes; 0=no</p> <p>1=endowment insurance 2=medical insurance 3=injury insurance 4=unemployment insurance 5=other</p> <p>1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree</p>
<p>I believe that crop insurance would become far more important to me if I were to increase my farming operation by renting land (production rights) from a Land Transfer Center or from private individuals. Are you willing to give up the use right or with compensation Under _____ you are willing to give up the land use right</p>	<p>1=yes; 0=no</p> <p>1=<i>hukou</i>; 2=urban social insurance; 3=stable job opportunity; 4=house in urban areas; 5=enough compensation amount of money; 6=appropriate transaction pattern; 7=other</p> <p>1=yes; 0=no</p>
<p>Do you have a certificate for your Land Use Rights How would you describe your current situation with respect to contracting (renting) land use rights (production rights)?</p>	<p>1= You rent land in, through a land transfer center; 2= You rent land in, but not through a land transfer center (private contract); 3= You rent land in, through collective organization; 4= You rent land out, through a land transfer center; 5=e. You rent land out, but not through a land transfer center (private contract) 6= You rent land out, through collective organization; 7= You neither rent land in, nor rent land out but farm the land by yourself; 8= You neither rent land in, nor rent land out but leave the land idle.</p> <p>1=Sub-contract; 2= Lease; 3= Swap; 4=Transfer; 5= Joint shareholding entities</p>
<p>What mechanism do you use for land circulation If existing, how much for the collateral If existing, what is the interest</p>	<p>number</p> <p>number</p>

Table 12 Survey variables: rent-in

variable	unit
Consider the amount you currently pay to rent land (RMB/mu) for land production rights. If the rental price increased by 30% (for example 1000 RMB to 1300 RMB/mu per year) would you?	1= Rent no more land 2=rent some land, but less than I planned 3 Rent the same amount of land that I planned to 4= Increase the amount of land that I will rent
Consider the amount you currently pay to rent land (RMB/mu) for land production rights. If the rental price decreased by 30% (for example 1000 RMB to 700 RMB/mu per year) would you?	1=rent some land, but less than I planned 2=rent the same amount of land that I planned to 3=moderately increase the amount of land that I would rent above what I had planned 4= significantly increase the amount of land I would rent above what I originally planned
payment option	1= Pay in full 2=pay in installment 3=others
whether the rent in land has the certificate of land use right	1=yes; 0=no
whether the rent in land could be transferred again	1=yes; 0=no
whether the rent in land could be used as collateral to borrow the use after transfer in	1=yes; 0=no
Do you have the contract	1=food crop ; 2=economic crop ; 3=horticulture ; 4=other
The contract is made by	0=no, 1=yes
Whether to need the approval form collective organization (rent in village)	1=farmer themselves, 2=collective economic organization, 3=land transfer center, 4=whom transfer out farmer or collective organizations
The contract is signed with	0=no, 1=yes
Based on your current intentions to rent land in the future, do you plan on investing in agricultural machinery to improve the efficiency of agricultural production?	1=with farmer 2= with collective economic organization 3=with farmer but under the approval of collective organization
I am willing to try some new economic management subjects such as family farm or collective farm	1=Strongly Disagree, 2=Moderately Disagree , 3=Agree, 4=Moderately Agree, 5=Strongly Agree
Over the next three years I am willing to increase the size of my land base to make a commercial scale operation.	1=Strongly Disagree, 2=Moderately Disagree , 3=Agree, 4=Moderately Agree, 5=Strongly Agree
Over the next three years I would prefer to have diversified crops planting by renting land production rights	1=Strongly Disagree, 2=Moderately Disagree , 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I am willing to pay a higher rental price for land if the agreement comes with a guarantee of payment	1=Strongly Disagree, 2=Moderately Disagree , 3=Agree, 4=Moderately Agree, 5=Strongly Agree

Table 13 Survey variables: rent-in (continued)

I am willing to pay a higher rental price for land if the land rented is concentrated or not fragmented.	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I am willing to pay a higher rental price for the land rental contract has a longer term (e.g. 3 or 5 years versus 1 year)	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I am willing to pay a higher rental price for land if the transfer agreement is arranged through a formal Land Transfer Center rather than individual or non-governmental institution instead.	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I am willing to pay a higher rental price for land if the number of mu rented (the block size) is large.	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I am willing to pay a higher rental price for land if irrigation is more convenient and accessible.	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I am willing to pay a higher rental price for land if the rented land is close to my village or community.	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I am willing to pay a higher rental price for land if the quality of land is better than my own personal land allocation.	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I am willing to pay a higher rental price for land if I can grow more profitable, higher valued crops than is traditionally grown in my village area.	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I will willing to pay a higher rental price if I can have access to crop subsidy when I increase or diversify my farming operation by renting land (production rights) from a Land Transfer Center or from private individuals.	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I will be willing to transfer in land if I can secure the loan by land use right	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I am more willing to transfer land if simplifying the process	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
Purchasing insurance to reduce the production risk is important to land transfer	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
circulate area size	mu
rent	yuan/mu/year
term of contract	year
Thinking 5 years from now, how large of a land base do you think would be desirable for the scale of farm operation you most desire	mu
How many additional Mu do you plan to rent for agricultural production next year at current rental prices	mu
How much of maximum price you think you are willing to pay	yuan/mu/year

Table 14 Survey variables: rent-out

Variable	Unit
payment option	1=Pay in full 2=pay in installment 3=others
The land is from	1=contracted land 2= circulated land
Whether to need the approval form collective organization (rent in village)	0=no, 1=yes
Do you have the contract	0=no, 1=yes
The contract is made by	1=farmer themselves, 2=collective economic organization, 3=land transfer center, 4=whom transfer in (farmer or collective organizations)
The contract is signed with	1=with farmer 2= with collective economic organization 3=with farmer but under the approval of collective organization
circulate to whom	1=friends or relatives; 2=collective organizations; 3=farmer farm; 4=collective farm; 5=agricultural corporations; 6=big and professional farm; 7=others
the reason of rent out	1=land is too much 2=land fragmentation 3=not much revenue 4=non-agricultural job 5=other
the use after transfer in	1=food crop ; 2=economic crop ; 3=horticulture ; 4=other
What do you plan to do with the land use rights money you receive	1=Pay off debts; 2=Spend on usual household expenses; 3=Pay medical expenses; 4=Purchase a retirement fund; 5=Invest in financial assets (e.g. STOCKS, BONDS, CDs, MUTUAL FUNDS); 6=Invest in existing on farm business activity ; 7=Invest in existing off farm business activity; 8=Invest in new on farm business activity; 9=Invest in new off farm business activity; 10=Spend on one-time household expenses; 11=I have not decided how to use the money; 12=other
Describe the status that mostly fits	1=non-farm enterprise ; 2=off-farm wage labor ; 3=farm wage labor ; 4=no job ; 5=in retirement; 6=other
I need to receive a higher rental price for land if the agreement does not comes with a guarantee of payment	1=Strongly Disagree, 2=Moderately Disagree , 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I need to receive a higher price for the land is concentrated not fragmented	1=Strongly Disagree, 2=Moderately Disagree , 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I need to receive a higher rental price for land the rental contract has a longer term (e.g. 3 or 5 years versus 1 year)	1=Strongly Disagree, 2=Moderately Disagree , 3=Agree, 4=Moderately Agree, 5=Strongly Agree

Table 15 Survey variables: rent-out (continued)

I need to receive a higher rental price for land if the transfer agreement is arranged through an individual or non-governmental institution rather than formal Land Transfer Center instead.	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I need to receive a higher rental price for land if the land use right could be used to borrow against the collateral.	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I need to receive a higher price for the land irrigation is accessible.	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I need to receive a higher price for the land is close to our village or community.	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I need to receive a higher rental price for land if the quality of land is better than other villagers' personal land allocation.	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I need to receive a higher rental price for land if the tenant can grow more profitable, higher valued crops than is traditionally grown in my village area.	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I need to receive a higher rental price for land if I have access to crop subsidy and the subsidy to planting ones when other people plant my land	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I still need to receive a higher rental price for land if I have access to crop subsidy, the subsidy to contracted ones when I am the contract one.	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
whether to prohibit renter to circulate land out again	0=no, 1=yes
whether prohibit renter to borrow against the collateral by land	0=no, 1=yes
Simplifying the process, I am more willing to rent out my land	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
Access to loan by contract, I am more willing to rent out my land	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
circulate area size	mu
rent	yuan/mu/year
term of contract	year
Thinking next year, how large of a land base do you think would rent out	mu
How much of minimum price you think you are willing to accept	yuan/mu/year

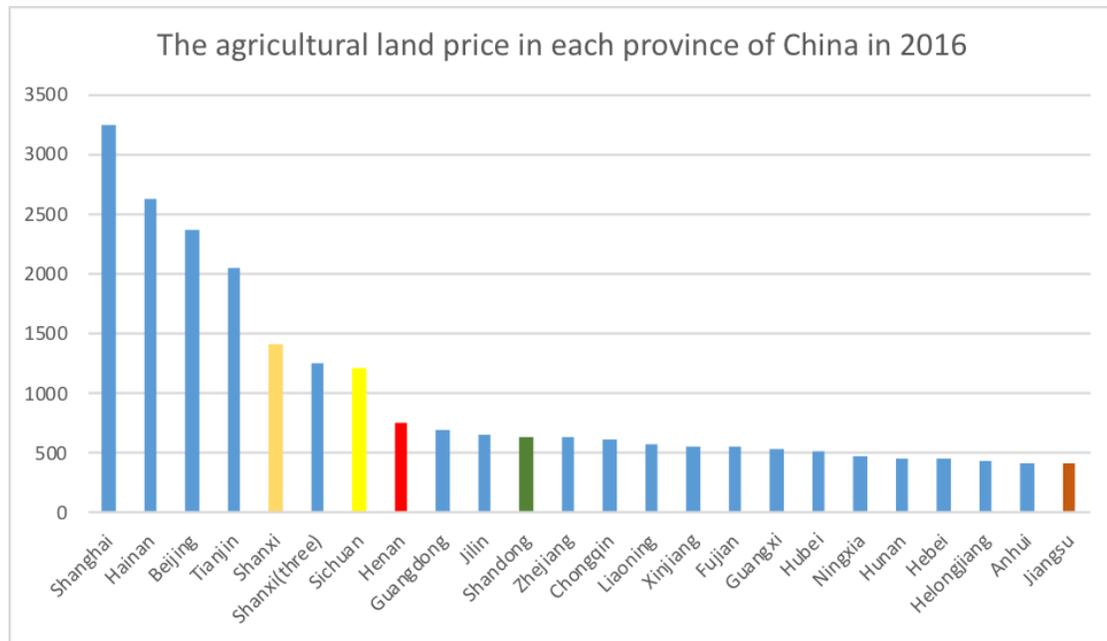
Table 16 Survey variables: neither rent-out nor rent-in

Variables	Unit
I have decided not to rent additional land because I have no desire to farm additional lands	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
Relative to other farmers my agricultural ability is low	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I would not be able to find labor required to grow more crops	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I do not believe that I can be profitable given current land rental prices	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
No appropriate land available, such as access to irrigation and good grade of land quality	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
No official transfer service platform provided, such as land bank or land transfer center	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I fear that the rental contract will not be honored	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I have decided not to rent out my land because I am satisfied with my current living and family conditions and simply do not want a change.	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I am afraid that I will lose social service guarantees without land	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I believe that rental rates are too low	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
There is no official service platform provided, such as land bank or land transfer center in my area	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I can find no information channel such as a website or resource center that explains the tenant-lease relationship	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I worry that the renter will the break of contract	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I do not want to take the risk of decreased land quality	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree
I am afraid that I will lose farm subsidy.	1=Strongly Disagree, 2=Moderately Disagree, 3=Agree, 4=Moderately Agree, 5=Strongly Agree

4.3 Site

Figure 5 shows the average agricultural land rental price in specific province, including our field sites: Shandong, Sichuan, Shaanxi, Jiangsu, and Henan. The price in Shaanxi, Sichuan ranked the first, accounting for 1261 RMB, and 1211 RMB. The prices in Sichuan, Henan were 750 RMB and 630 RMB. The most interesting fact is the agricultural land rental price in Jiangsu was just 420 RMB.

Figure 6 The farmland price in 2016⁶



The demographic and characteristics of respondent households are reported in **Table 14** and **Table 15**.

In terms of the mean, the age of respondents was 56 years old. Farmers have planted for the average 32 years, and the education level was between attending elementary (primary- school) and completing middle school. The average income was 134,481

⁶ Data from <https://www.tuliu.com>

RMB/year with around 54.26% of household income from farm activities. Their average land size was 7.1 mu.

Most respondents, approximately 76.47%, were primary decision makers in the family and approximately 84.83% of respondents stated that they didn't have any household members working for village committee, state government, county government, state enterprise, RCC or land banks. Some of respondents (39.13%) considered their cultivation ability were worse than others within the village, however, they still worked in agriculture.

Table 17 Demographics: first-round field experiment (discrete variables)

	Shandong			Sichuan			Shanxi			Total		
	Freq.	Percent	Freq.	Percent	Freq.	Percent	Freq.	Percent	Freq.	Percent	Freq.	Percent
Gender												
Female	64	56.64	48	43.64	40	43.64	40	40	152	47.2	152	47.2
Male	49	43.36	61	55.45	60	55.45	60	60	170	52.8	170	52.8
Primary decision maker												
No	34	30.09	17	15.45	25	15.45	25	25	76	23.53	76	23.53
Yes	79	69.91	93	84.55	75	84.55	75	75	247	76.47	247	76.47
Educational level												
never went to school	2	1.76	2	1.82	7	1.82	7	7	11	3.4	11	3.4
at least primary school	5	4.42	12	10.91	31	10.91	31	31	48	14.86	48	14.86
at least middle school	24	21.24	39	35.45	48	35.45	48	48	111	34.37	111	34.37
at least high school	68	60.18	29	26.36	12	26.36	12	12	109	33.75	109	33.75
some professional university or college	11	9.73	18	16.36	1	16.36	1	1	30	9.29	30	9.29
completed college or university	3	2.65	10	9.09	1	9.09	1	1	14	4.3	14	4.3
household members work for village leader, village												
Yes	11	9.73	25	22.73	87	22.73	87	87	274	84.83	274	84.83
No	102	90.27	85	77.27	13	77.27	13	13	49	15.17	49	15.17
To what extent for separation of land use right												
Never heard of	36	32.43	41	37.27	42	37.27	42	42	119	37.07	119	37.07
Known, but not familiar with	60	54.06	52	47.27	45	47.27	45	45	157	48.91	157	48.91
Familiar, and know its purpose	15	13.51	17	15.45	13	15.45	13	13	45	14.02	45	14.02
Strongly disagree	6	5.31	8	7.27	10	7.27	10	10	24	7.45	24	7.45
My cultivation ability is better than others within the village												
Moderately disagree	56	49.56	40	36.36	30	36.36	30	30	126	39.13	126	39.13
agree	16	14.16	22	20	27	20	27	27	65	20.19	65	20.19
Moderately agree	23	20.35	29	26.36	23	26.36	23	23	75	23.29	75	23.29
Strongly agree	12	10.61	11	10	10	10	10	10	32	9.94	32	9.94

Table 18 Demographics: first-round field experiment (continuous)

	Shandong		Sichuan		Shanxi		Total	
	Mean	Stdv.	Mean	Stdv.	Mean	Stdv.	Mean	Stdv.
age	54.509	11.426	55.65	12.57	56.32	10.71	55.46273	11.60809
household size	4.487	2.147	4.57	3.88	4.38	1.66	4	3
Number of agricultural labor	1.894	1.319	2.01	3.01	1.55	1.25	2	2
Number of off-farm labor	1.216	1.253	1.3	1.16	1.44	1.04	1	1
years of farming land size	28.699	14.698	31.8	18.65	35.32	12.45	32	16
Income from Agriculture	58288.88	144424.9	132543	532156	23882.5	164139.5	72969.98	337231.4
Income from off-farm activities	27842.86	55913.81	80628	140406.5	37664.5	32506.65	52369.35	92270.4
Total income	97151.02	151351.7	213613.5	615303.8	89267.55	282565.3	134488.1	405429.5
Production expenditure	38853.76	106281	106938	392800	13763.2	93879.49	54368.68	246402.3
Household expenditure	21942.86	14747.64	37723	83828.34	17973.07	19163.07	26100.83	51454.3
Other expenditure	5425.357	7271.666	9529.358	12612.66	11010.02	80015.33	8558.698	45369.87
Gross income	31463.84	86828.67	78081.09	261268.7	23374.59	82561.98	44918.58	168931.5

In terms of the second-round choice experiment, the demographic and characteristics of respondents are reported in *Table 16*. The age of respondents was 53.25 years old, a little younger than that of first-round experiment. The average number of years farming was 31.75 years, while the average educational level was between primary school (25.42%) and completing middle school (38.75%). The average land size was 7.08 mu. These are consistent with the same characteristics of respondents reported in the first round.

Most of respondents (67.5%) were primary decision makers in family affairs. Nearly 60.25% of respondents had not heard of a land transfer center, while 17.15% of respondents knew the name of land transfer center, but not familiar with the functions. Though 15.48% of respondents had cooperation with land transfer center, however, they were all from Jiangsu Province. Aside from that, almost 87.66% of respondents recalled that the registration of land use right had seen achieved.

Table 19 Demographics: second round field experiment

	Jiangsu			Henan			Total		
		Freq.	Percent	Freq.	Percent	Freq.	Percent	Freq.	Percent
Gender	Female	42	35	101	84.17	143	59.58		
	Male	78	85	19	15.83	97	40.42		
Primary decision	No	26	21.67	52	43.33	78	32.5		
	Yes	94	78.33	68	56.67	162	67.5		
Educational level	never went to school	22	18.33	10	8.33	32	13.33		
	at least primary school	23	19.17	38	31.67	61	25.42		
	at least middle school	39	32.5	54	45	93	38.75		
	at least high school	29	24.17	14	11.67	43	17.92		
	some professional university or college	7	5.83	3	2.5	10	4.17		
	completed college or university	0	0	1	0.83	1	0.42		
To what extend for land transfer center	Never heard of	47	39.17	97	81.51	144	60.25		
	Known, but not familiar with	20	16.67	21	17.65	41	17.15		
	Familiar, but not work through that	16	13.13	1	0.84	17	7.11		
	Work through that	37	30.83	0	0	37	15.48		
Land use right registration	No	16	13.13	13	11.3	29	12.34		
	Yes	104	86.67	102	88.70	206	87.66		
	Mean	Stdv.	Mean	Stdv.	Mean	Stdv.	Mean	Stdv.	Mean
age	55.625	11.188	50.875	9.433	53.25	10.597			
Household size	4.192	1.568	4.6	1.542	4.396	1.565			
Years of farming	30.142	15.230	33.451	14.286	31.75	14.841			
Land size (contracting)	8.895	4.302	5.288	3.689	7.091	4.388			
Agricultural income	356691.4	104514	12462.69	21388.68	187494.2	763610.2			
Non-agricultural income	81924	207132.9	31463.03	33542.97	56799.5	150496.3			
Total income	438616	106835.7	45642.94	40049.22	243879.9	782701.3			
Production expenditures	301813.4	822880.6	4169.438	12269.63	158123.2	616850			
Daily expense	45223.33	50230.04	24480	1670.548	23150.15	42135.82			
Other expense	12120.83	17501	655.3595	3152.88	6485.261	13891.28			
Net income	79548.65	220837	25368.05	69811.88	53467.06	168217.7			

CHAPTER 5 Empirical Results and discussions

This chapter provides the product of my analytic process, including the econometric models and statistical analyses that had been conducted.

5.1 Estimation

5.1.1 Application of Logit models

The applicability of Logit model in this thesis could be summarized as follows: First, the preference variation refers to the value that decision makers place on each attribute of the alternatives varies. Farmers' preferences for land also vary for reasons that are not linked to observed demographic characteristics. Logit models can capture preference variations when tastes vary systematically in the population in relation to observed variables.

Second, the substitution patterns refer to when the preference attributes of one alternative improve, the probability of it being chosen to rise. This pattern of substitution reflects the changes of preference on rental land and affects the demand and supply as attributes change.

A farmer, labeled n , faces 2 rental alternatives of land: rent-in or rent-out. The utility that the farmer n obtains from alternatives 1 and 2 can be written down as

$$U_{nj} = V_{nj} + \varepsilon_{nj} \text{ for } j = 1 \text{ or } 2. \quad 4)$$

The probability that farmer n choose land 1 is

$$P_{n1} = \text{Prob}(V_{n1} + \varepsilon_{n1} > V_{n2} + \varepsilon_{n2}) \quad 5)$$

$$= \text{Prob}(\varepsilon_{n2} < \varepsilon_{n1} + V_{n1} - V_{n2}) \quad 6)$$

5.1.2 Conditional Logit model

Conditional logit model (McFadden, 1973) is the “workhorse” model for analyzing discrete choice data. The function of conditional logit model is the following, assuming ε_{ij} exhibiting the extreme value distribution⁷.

$$U_{ij} = V_{ij} + \varepsilon_{ij} \quad 7)$$

$$\varepsilon \sim EV1(0, \lambda) \quad 8)$$

The Logit choice probabilities have a closed form:

$$P_{ij} = \frac{\exp(\lambda^{-1}V_{ij})}{\sum_{l \in C_l} \exp(\lambda^{-1}V_{il})} \quad 9)$$

We begin by estimating the model for rent-out, rent-in

Rent-out:

$$\begin{aligned} U_{ij} = & \beta_1 X_{rent,ij} + \beta_2 X_{guarantee\ payment,ij} + \beta_3 X_{land\ fragmentation,ij} \quad 10) \\ & + \beta_4 X_{term\ of\ year,ij} + \beta_5 X_{use\ righ\ to\ secure\ the\ loan,ij} \\ & + \beta_6 X_{land\ transfer\ center,ij} + \beta_7 X_{irrigation\ facilities,ij} \\ & + \beta_8 X_{distance,ij} + \beta_9 X_{land\ quality,ij} + \beta_{10} X_{land\ profitability,ij} + \varepsilon_{ij} \end{aligned}$$

⁷ The distribution often referred to as the Extreme Value Distribution (Type I). The PDF and CDF are given by:

$$\begin{aligned} f(x) &= \frac{1}{\beta} e^{\frac{x-\mu}{\beta}} \exp\left[-e^{\frac{x-\mu}{\beta}}\right] \\ F(x) &= 1 - \exp\left[-e^{\frac{x-\mu}{\beta}}\right] \end{aligned}$$

Rent-in:

$$\begin{aligned} U_{ij} = & \beta_1 X_{rent,ij} + \beta_2 X_{guarantee\ payment,ij} + \beta_3 X_{land\ fragmentation,ij} & 11) \\ & + \beta_4 X_{term\ of\ year,ij} + \beta_5 X_{landsize,ij} + \beta_6 X_{land\ transfer\ center,ij} \\ & + \beta_7 X_{irrigation\ facilities,ij} + \beta_8 X_{distance,ij} + \beta_9 X_{land\ quality,ij} \\ & + \beta_{10} X_{land\ profitability,ij} + \epsilon_{ij} \end{aligned}$$

This model has several limitations. The first is that conditional logit model cannot account for preference heterogeneity among respondents. Second, the IIA property⁸ would lead to unrealistic prediction. Consequently, the mixed logit model has been advanced in the CE literature to extend the standard conditional logit model to allow one or more parameters to be randomly distributed. (Hanley, Robert, & Vic , 1998)

5.1.3 Mixed Logit model

Following the literature, I expect the random utility model using the Mixed Logit model. Since the data comes from unlabeled choice experiment and then the alternatives have no utility over and above the characteristics attributed to them in the experiment, so this model does not have alternative-specific constants.

The Mixed Logit Model should, in terms, provide results consistent with the Conditional Logit model, particularly when Bayesian allowance for IIA are excluded. Thus, I expect the Conditional and Mixed Logit results could be the same for the round-1 experiment, while the Mixed Logit would be econometrically superior (more efficient)

⁸ Independence of irrelevant alternatives (IIA)

in the second round that address the IIA. As a point of comparisons, I include both models, but will primarily rely on the Mixed Logit results for discussion purpose

We begin by estimating the Mixed Logit Model in which the coefficient for price is fixed and the remaining coefficients are random, normally distributed. In order to allow for preference heterogeneity of other attributes except price, we assume the main effect parameters vector β_i ($i \geq 2$) follows a normal distribution parametrically characterized by θ (in this case, this mean and standard deviation of $\beta_{ij}, \sigma_{ij}, i \geq 2$). Namely,

$$\beta_i \sim f(\beta_i | \theta_{\beta_i}) \quad 12)$$

The reduced-form model for **Rent-out**:

$$\begin{aligned}
 U_{ijt} = & \beta_{1j} X_{rent,ijt} + \beta_{2j} X_{guarantee\ payment,ijt} + \sigma_{2j} X_{guarantee\ payment,ijt} & 13) \\
 & + \beta_{3j} X_{land\ fragmentation,ijt} + \sigma_{3j} X_{guarantee\ payment,ijt} + \beta_{4j} X_{term\ of\ year,ijt} \\
 & + \sigma_{4j} X_{term\ of\ year,ijt} + \beta_{5j} X_{use\ righth\ to\ secure\ the\ loan,ijt} \\
 & + \sigma_{5j} X_{use\ righth\ to\ secure\ the\ loan,ijt} + \beta_{6j} X_{land\ transfer\ center,ijt} \\
 & + \sigma_{6j} X_{land\ transfer\ center,ijt} + \beta_{7j} X_{irrigation\ facilities,ijt} \\
 & + \sigma_{7j} X_{irrigation\ facilities,ijt} + \beta_{8j} X_{distance,ijt} + \sigma_{8j} X_{distance,ijt} \\
 & + \beta_{9j} X_{land\ quality,ijt} + \sigma_{9j} X_{land\ quality,ijt} + \beta_{10j} X_{land\ profitability,ijt} \\
 & + \sigma_{10j} X_{land\ profitability,ijt} + \epsilon_{ij}
 \end{aligned}$$

Rent-in:

$$\begin{aligned}
 U_{ijt} = & \beta_{1j}X_{rent,ijt} + \beta_{2j}X_{guarantee\ payment,ijt} + \sigma_{2j}X_{guarantee\ payment,ijt} \\
 & + \beta_{3j}X_{land\ fragmentation,ijt} + \sigma_{3j}X_{land\ fragmentation,ijt} + \beta_{4j}X_{term\ of\ year,ijt} \\
 & + \sigma_{4j}X_{term\ of\ year,ijt} + \beta_{5j}X_{landsize,ijt} + \sigma_{5j}X_{landsize,ijt} \\
 & + \beta_{6j}X_{land\ transfer\ center,ijt} + \sigma_{6j}X_{land\ transfer\ center,ijt} \\
 & + \beta_{7j}X_{irrigation\ facilities,ijt} + \sigma_{7j}X_{irrigation\ facilities,ijt} + \beta_{8j}X_{distance,ijt} \\
 & + \sigma_{8j}X_{distance,ijt} + \beta_{9j}X_{land\ quality,ijt} + \sigma_{9j}X_{land\ quality,ijt} \\
 & + \beta_{10j}X_{land\ profitability,ijt} + \sigma_{10j}X_{land\ profitability,ijt} + \epsilon_{ij}
 \end{aligned} \tag{14}$$

The mixed logit choice probability is given by:

$$P_{ni} = \int \frac{\exp(X_{n1}'\beta)}{\exp(X_{n1}'\beta) + \exp(X_{n2}'\beta)} f(\beta_j|\theta) d\beta \tag{15}$$

Where $f(\beta_j|\theta)$ is the density function of β . It allows the coefficients to vary, which implies that it allows for the fact that different decision makers may have different preferences and not hold the IIA property.

If we observe a particular farmer making six choices in one card, this can be considered as the probability of a particular sequence of choices, it is given by

$$S_n = \int \prod_{t=1}^T \prod_{j=1}^J \left[\frac{\exp(X_{n1}'\beta)}{\exp(X_{n1}'\beta) + \exp(X_{n2}'\beta)} \right]^{y_{nit}} f(\beta_j|\theta) \tag{16}$$

Where $y_{nit} = 1$ if the individual chooses alternative j in choice situation t and 0 otherwise.

The θ parameters can be estimated by maximizing the simulated log-likelihood function:

$$SLL = \sum_{n=1}^N \ln \left(\frac{1}{R} \sum_{r=1}^R \prod_{t=1}^T \prod_{j=1}^J \left[\frac{\exp(X_{nit}' \beta_n [r])}{\exp(X_{n1t}' \beta_n [r]) + \exp(X_{n2t}' \beta_n [r])} \right]^{y_{jnt}} \right) \quad 17)$$

Where $\beta_n [r]$ is the r-th draw for farmer n from the distribution of β . This is the standard approach used in STATA while is used for econometric analysis.

5.2 Result: Logit model

In this section, the Mixed Logit model is presented with the Conditional Logit models provided in the Appendix.

5.2.1 First round

5.2.1.1 Rent-in

In each model, the coefficients on the attributes are estimated to meet the expectations. According to *Table 17*, there are several significant factors affecting farmers' decisions in each province. The major drivers of farmers' willingness to rent in their land are price of rent, fragmentation, lot size, access to irrigation facilities, land quality and land profitability. Respondents dislike higher rent, guarantee payment, fragmented land, smaller lot size, shorter terms of contract. They prefer to rent in land which has access to irrigation facilities, are close to their home and have high quality and profitability.

The data presented in *Table 17* reveals the characteristics of land transfer at the provincial level, including Shandong, Sichuan, and Shaanxi Province. In those three provinces, land fragmentation exerts significant negative effects on farmers' willingness

to rent in land. In general, farmers value land profitability more than land quality, but they seem to be unclear about these concepts.

In Shandong, farmers are willing to have longer terms of contract. We could conclude that the longer term of contract provides greater stability for rural land lessees and encourage them put long-term investment into such land, which a way to maximize the benefits of farming.

In Sichuan, fragmentation greatly decreases farmers' willingness to rent the specific land in, which is the biggest obstacles. Land fragmentation is the biggest obstacle in this province for rent in. Considering the geographical conditions of Sichuan, we could understand the importance of the land fragmentation. The attributes of "distance to village" is also crucial for farmers' decisions though it is very common in Sichuan Province that one's plot is far away from their home.

While in Shaanxi, guarantee payment exerts the most significant negative effect on farmers' willingness to rent in land. The lower average income and underdeveloped economic situation in Shaanxi could help us understand that respondents are more sensitive to price. Aside from the difference in guarantee payment, they prefer greater size of land to rent in, which is another significant factor on this area. According to the survey data, the average farming land in Shaanxi Province is 16.32 mu. The farm size matters for the production in Shaanxi Province because there may be economies of scale and different operation subjects for scale farming. The greater farm size would make farmers more easily get access to knowledge, credit, and insurance.

Table 20 Mixed Logit model: first round rent-in

Decision	Shandong			Sichuan			Shaanxi			Total		
	Coefficient	Std. Err	P									
Mean												
Rent	-0.0046	0.0028	0.102	-0.0021*	0.0010	0.041	-0.001	0.001	0.370	-0.0013**	0.0005	0.010
Guarantee payment	0.0495	0.4979	0.921	0.0876	0.3092	0.777	-0.277	0.193	0.152	-0.0833	0.1627	0.609
fragmentation	-3.0897*	1.3882	0.026	-2.4255**	0.8377	0.004	-0.662*	0.278	0.017	-1.1839**	0.3269	0.000
Lot size	0.0129	0.0071	0.068	0.0057	0.8036	0.112	0.004*	0.002	0.026	0.0065**	0.0018	0.000
term of contract year	0.6428*	0.2760	0.020	0.1326	0.1174	0.259	-0.002	0.056	0.974	0.1130*	0.0545	0.038
Institution	-0.5923	0.5857	0.312	0.0481	0.3094	0.877	0.326	0.204	0.110	0.1527	0.1746	0.000
Irrigation	3.4996*	1.6057	0.029	1.3650**	0.4773	0.004	0.818**	0.291	0.005	1.3788**	0.2295	0.000
Distance to village	0.7205	0.6219	0.247	0.9342*	0.4353	0.032	0.170	0.193	0.376	0.4378*	0.1775	0.014
Land quality												
middle	-1.980	1.1351	0.081	0.8632	0.5477	0.115	0.619	0.324	0.056	0.5388	0.282	0.056
High	-0.106	0.5786	0.855	1.3749*	0.6761	0.042	1.00**	0.271	0.000	0.7784**	0.2224	0.000
Land profitability												
middle	0.9077	0.7355	0.217	0.7086	0.5633	0.208	0.796*	0.361	0.027	0.8420**	0.2729	0.002
High	3.9499*	1.6422	0.016	1.4065*	0.5720	0.014	1.374**	0.317	0.000	1.6509**	0.3142	0.000
SD												
Guarantee payment	-1.3628	1.1253	0.226	0.4206	0.4717	0.373	0.023	0.234	0.923	0.3853	0.4438	0.385
fragmentation	-1.6673	0.9014	0.064	-1.1679	0.7734	0.131	0.245	0.365	0.502	1.2992**	0.4479	0.004
Lot size	0.0160*	0.0080	0.047	-0.0106	0.0079	0.178	0.000	0.002	0.928	-0.0063	0.0033	0.055
term of contract year	0.7884*	0.3886	0.042	0.2425	0.1942	0.212	0.009	0.132	0.944	0.3010**	0.0906	0.001
Institution	-0.3932	0.9904	0.691	0.5793	0.7192	0.421	-0.064	0.332	0.848	0.7037*	0.2755	0.011
Irrigation	0.3609	0.9890	0.715	1.3430*	0.5224	0.01	-0.509	0.335	0.129	1.0243**	0.3365	0.002
Distance to village	-2.6294*	1.0250	0.010	-0.9276	0.6606	0.160	-0.047	0.242	0.847	1.0725**	0.2613	0.000
Land quality												
middle	1.7659	0.9170	0.055	-0.9270	0.9902	0.349	-0.009	0.350	0.980	0.6005	0.6409	0.349
High	-1.0564	0.7543	0.161	-1.1709	0.6507	0.072	0.0430	0.282	0.879	0.7873*	0.3699	0.033
Land profitability												
middle	1.1943	0.8724		0.3866	0.9036	0.669	-0.080	0.502	0.874	-0.0751	0.5098	0.883
High	-3.2031*	1.4321		1.4612	0.8572	0.088	-0.133	0.642	0.836	0.7751*	0.3623	0.032
ll(Null)	-166.376			-187.8089			-173.005			-550.5778		
AIC	333.3537			408.7996			390.2827			1116.771		
BIC	432.9782			512.1211			490.9474			1233.339		

* p<0.05, ** p<0.01, *** p<0.001

5.2.1.2 Rent-out

Farmland's price also depends upon the supply offered to the market. We further attempted to identify the factors in the supply market. The data presented in *Table 18* reveals the result of the experiment.

The most significant factor for motivating farmers to rent-out their land is the participation of land transfer center and the term of contract. Under the guarantee by land transfer centers, farmers are more willing to rent out land in the three provinces. Aside from the role of land transfer centers, farmers are more willing to rent out land with longer terms of contract. It seems that land ownership stability has a negative influence on the lease length, while in China's rural land transfer market which is characterized by land ownership instability, farmers, especially lessors, prefer a longer term of contract. In some cases, the length of the contract is left open at the time of contracting, while in others there is no mention about the duration.

In general, farmers in these three locations display a similar trend in land transfer center and terms of contract. In terms of the right to use the contract as collateral, it seems to have no effect on farmers' decision in Sichuan and Shaanxi, however, the right would greatly decrease farmers' decision to rent out land in Shandong. Farmer who "own" the land could use the land to borrow loan, which proves that they had the income resource which could repay their loans in the future. Aside from this unexpected finding, another interesting finding is how people conceive the "similar" attributes of land, land quality and land profitability. It seems that people are more willing to rent out their land which has higher land profitability, with lower land quality. The result of lower land quality could be understandable because farmers who rent out land have a very clear

understanding of land quality, which could be quantified by soil quality. On the other hand, the result of the higher land profitability is unexpected, but it could be understandable in terms of the subjectivity in farmers' perspectives. Farmers may assume the profitability relies more on farming itself instead of objective facts.

In Shandong, when farmers rent out land, they prefer higher rent, longer terms of contract, lower quality land, which is also far away from their home. However, it is against our expectation that they prefer to rent out concentrated land, which has access to irrigation facilities. It seems that they are also struggling to provide a fair market and supply high-quality land in the "hypothetical market". Suppose they truly have such land that is fragmented and have no access to irrigation facilities, they may understand that farmers who rent in their land are disadvantaged so they may be willing to accept a lower price for a fair transaction.

In Sichuan, when farmers rent out land, they also prefer higher rent, guarantee payment, longer terms of contract and fragmented land, which is also far away from their home and have access to irrigation facilities. In Shaanxi, they prefer higher rent, guarantee payment, and shorter terms of contract. One of the interesting facts is they prefer shorter terms of contract when renting out land. It seems they rely more on land and treat it as a security for themselves. If they rent out for a long time, it may make them feel that they do not "own" the land.

In sum, respondents in these three provinces prefer higher rent, guarantee payment, and longer terms of contract, the participation of land transfer centers and land which is fragmented and has access to irrigation facilities. They also prefer to rent out their lower quality and high profitability land.

Table 21 Mixed Logit model: first round rent-out

Decision	Shandong			Sichuan			Shaanxi			Total		
	Coefficient	Std. Err	P									
Mean (μ)												
Rent	0.00271	0.0009	0.761	0.00107	0.0012	0.368	0.0012	0.001	0.229	0.0007	0.0005	0.154
Guarantee payment	-0.0328	0.2783	0.906	0.5978	0.3324	0.072	0.1535	0.291	0.598	0.1652	0.1525	0.279
fragmentation	-0.2573	0.3090	0.405	-0.2299	0.35557	0.518	-0.3286	0.288	0.254	-0.2319	0.1620	0.152
term of contract year	0.0926	0.0640	0.148	0.1446	0.0883	0.102	-0.0621	0.075	0.409	0.097**	0.0375	0.01
Collateral right	-0.4445	0.2288	0.052	-0.0299	0.3688	0.935	-0.01636	0.240	0.946	-0.1505	0.1263	0.233
Institution	0.6345*	0.2885	0.028	1.3989**	0.4083	0.001	0.9930*	0.4088	0.015	0.7905**	0.1267	0.00
Irrigation	0.12557	0.3058	0.681	0.1166	0.3307	0.724	0.4044	0.299	0.176	0.1280	0.1411	0.365
Distance to village	-0.2430	0.2200	0.269	-0.3671	0.2773	0.183	-0.1392	0.2384	0.559	-0.2506	0.1201	0.037
Land quality												
middle	-0.1663	0.3255	0.610	-0.388	0.4530	0.392	-0.3324	0.3548	0.349	-0.2053	0.1819	0.259
High	-0.3313	0.2871	0.249	-0.0138	0.3654	0.970	-0.4452	0.3259	0.172	-0.2338	0.1685	0.165
Land profitability												
middle	0.2400	0.3199	0.453	0.4261	0.4536	0.348	0.2577	0.3401	0.449	0.2381	0.1747	0.173
High	0.5919	0.3369	0.079	0.2740	0.4142	0.508	-0.1092	0.3163	0.730	0.2115	0.1772	0.232
SD												
Guarantee payment	0.2596	0.9449	0.784	0.1414	0.6803	0.835	0.3721	0.7232	0.607	0.3187	0.4715	0.499
fragmentation	1.1811	0.727	0.105	-0.8362	0.7841	0.286	-0.1811	0.5749	0.753	-0.8235	0.2842	0.004
term of contract year	0.0519	0.3895	0.894	0.1344	0.1515	0.375	0.2398	0.1378	0.082	0.1588	0.0712	0.026
Collateral right	-0.0766	0.4164	0.854	1.5069	0.5432	0.006	-0.2571	0.4379	0.557	-0.3319	0.3178	0.296
Institution	0.6511	0.6679	0.33	-0.6163	0.4411	0.162	1.1946	0.6287	0.057	0.5289	0.2705	0.051
Irrigation	1.0786*	0.4680	0.021	1.0426	0.5836	0.074	-0.3076	0.5029	0.541	0.6211	0.2423	0.01
Distance to village	0.2406	0.6401	0.707	0.4678	0.5164	0.365	0.3337	0.5103	0.513	0.1300	0.2566	-0.373
Land quality												
middle	-0.3609	0.5612	0.520	-1.3776	0.0025	0.086	-0.0287	0.6071	0.962	-0.0841	0.4867	0.863
High	-0.4103	0.8033	0.610	0.1837	0.7736	0.812	0.2292	0.4373	0.600	0.2980	0.4494	0.507
Land profitability												
middle	0.4640	0.7279	0.519	1.4935	0.7102	0.035	0.7946	0.7417	0.284	0.5795	0.4089	0.156
High	-0.7843	0.5660	0.166	-0.7982	0.4815	0.097	-0.1722	0.8186	0.833	0.5315	0.3515	0.131
ll(Null)	-235.002			-204.9384			-188.217			-642.4411		
AIC	507.0843			444.2281			422.434			1318.938		
BIC	612.0205			547.5496			523.5634			1447.388		

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

5.2.2 Second round

The second wave was a variant of the first but with an efficient Bayesian design to eliminate irrelevant alternatives, meaning that the parameters of the choice model are estimate with maximum precision. The second experiment takes account of the first time's correlation of estimates as prior variance and the parameter estimate as prior mean. The maximum simulation likelihood is used for estimation using STATA. Estimates are exhibited in *Table 19 (rent-in)* and *Table 20 (rent-out)*.

5.2.2.1 Rent-in

According to *Table 19*, we find five factors have a significant impact on farmers' decision on rent in land in general. Among the five factors, rent, fragmentation, land transfer center, irrigation and the land quality, profitability have significant impact on famers' decision. Farmers prefer lower rent, concentrated land, and greater land size, with the participation of land transfer center. They dislike longer terms of contract, land which has no access to irrigation facilities, far away from their home, low quality and profitability. In terms of rent, it is consistent with previous literature finding and supply-demand relationship that the price increases, the demand would decrease. Rent has a negative impact on famers' decision. In terms of rent in, the coefficients on land profitability and quality are positive, which indicates farmer who rent in would more treat the two attributes equally.

Several factors affecting farmers' decision on rent in are different between two field experiments. In Jiangsu, factors that strongly associate with famers' decision are rent, land fragmentation, irrigation, the location of land, land quality and land profitability. It is surprising that famers might be more willing to take shorter terms of contract with

greater amount of land when renting land in. Aside from that, the findings about guarantee payment, that farmers prefer paying the guarantee payment, indicates that they are willing to follow the contract in the “hypothetical” situation.

In Henan, factors that are strongly associated with farmers’ decisions are rent-price, whether the land has access to irrigation facilities, institution, land quality and profitability. As we know more, the irrigation facilities play an important role in production, so that’s why farmers care about that during making decisions, especially if water shortage is a serious problem in Henan. Many farmers put high weight on all resources, especially water. Also, many farms in Jiangsu were rice farms that could not exist without an abundance of water, whereas Henan was mostly wheat and corn. Additionally, they seem to be more willing to rent-in smaller amount of land compared to other provinces, which has negative coefficients.

Table 22 Mixed Logit model: second round rent-in

Decision	Jiangsu				Henan				Total			
	Coefficient	Std. Err	P		Coefficient	Std. Err	P		Coefficient	Std. Err	P	
Rent	-0.0035**	0.0005	0.000		-0.0037	0.0005	0.000		-0.0034**	0.0003	0.000	
Guarantee payment	0.6002*	0.2676	0.025		0.1626	0.2505	0.516		0.2445	0.1673	0.144	
Fragmentation	-0.9807**	0.3018	0.001		0.1836	0.2759	0.007		-0.7787**	0.1895	0.000	
Lot size	0.0066**	0.0022	0.003		-0.0425	0.0019	0.243		0.0029*	0.0012	0.019	
Term of contract years	-0.0233	0.0456	0.608		0.2095	0.0542	0.411		-0.0553	0.0297	0.062	
Institution	0.3313	0.2472	0.100		0.3245*	0.2278	0.000		0.505**	0.1460	0.001	
Irrigation	1.2339**	0.3417	0.000		-0.1649	0.2687	0.00		1.2639**	0.2053	0.000	
Distance to village	0.7433**	0.2585	0.004		0.3633*	0.2158	0.749		0.2848*	0.1449	0.049	
Land quality												
middle	0.3749	0.2208	0.089		-0.0785	0.2360	0.075		0.4333**	0.1489	0.004	
high	1.0516**	0.2208	0.000		0.3697*	0.2405	0.000		1.0046**	0.1530	0.000	
Profitability												
middle	0.0381	0.2395	0.874		0.2815	0.2485	0.000		0.3638*	0.1578	0.021	
High	1.2529**	0.2752	0.000		0.3443*	0.3196	0.000		1.2655**	0.1905	0.000	
SD												
Guarantee payment	-0.5223	0.2816	0.064		0.8043*	0.3409	0.018		0.7054**	0.2517	0.005	
fragmentation	1.9208**	0.3523	0.000		1.1538**	0.2533	0.000		1.2222**	0.1954	0.000	
lot size	0.0106**	0.0024	0.000		0.0071**	0.0027	0.000		-0.0070**	0.0015	0.000	
term of contract year	-0.1124	0.0722	0.119		0.2343**	0.0663	0.000		0.0793	0.0531	0.135	
Institution	0.8032*	0.3123	0.010		0.2701	0.3797	0.477		-0.3522	0.3247	0.278	
Irrigation	1.7050**	0.3173	0.000		-0.8009	0.4417	0.070		1.4670**	0.2069	0.000	
Distance to village	1.0649**	0.3292	0.001		0.8603**	0.2985	0.004		0.7954**	0.2232	0.000	
Land quality												
middle	-0.0668	0.2930	0.820		-0.5842*	0.2677	0.029		0.1568	0.1959	0.423	
High	-0.4107	0.2730	0.130		0.3013	0.2537	0.235		0.2753	0.2314	0.234	
Land profitability												
middle	-0.5724	0.4331	0.186		0.1646	0.3727	0.659		0.2906	0.3548	0.413	
high	-0.3152	0.4861	0.517		0.9089**	0.3192	0.004		0.4612	0.2523	0.068	
ll(Null)	-523.8945				-440.1255				-981.4366			
AIC	1012.353				892.3577				1906.582			
BIC	1136.328				1013.909				2045.319			

* p<0.05, ** p<0.01, *** p<0.001

5.2.2.2 Rent-out

We report estimates for our benchmark Mixed Logit model in rent-out, the data in *Table 20*. For the second-round choice experiment, Land transfer center is still a significant positive factor. They prefer higher rent, receiving guarantee payment, longer terms of contract years, the participation of land transfer center, and using right against collateral. The findings about guarantee payment support the goal of the policy and projected hypothesis to ensure famers' who rent out land rights, since considering the later period after transaction, especially after the period of land transfer and return to famers.

Second, land quality and land profitability exert positive coefficients on farmers' decision, which is surprising and interesting. This is likely to be the case that farmers all regard their land as high quality and high profitability and are not willing to define their land as low quality, even though in a theoretical environment, which is a kind of bias by choice experiment.

In Jiangsu, they prefer higher rent, longer terms of contract years, and willing to receiving guarantee payment. Aside from that, they are more willing to provide concentrated land which has higher quality and profitability, close to their home. However, access to irrigation facilities is a negative factor. They would value more on the attributes or require less if without the access to irrigation facilities.

In Henan, they place higher value on higher rent, concentrated land, and shorter terms of contract, lower quality land and receiving guarantee payment. They are also willing to receiving guarantee payment, which is consistent through all fields. The important finding is that if the rental price is high enough which WTP suggests will

happen, farmers are willing to rent-out land with the irrigation facilities. As we known, Henan has the problem of water shortage. The same as rent in, farmers value a lot on the access to irrigation.

Table 23 Mixed Logit model: second-round rent-out

Decision	Jiangsu			Henan			Total		
	Coefficient	Std. Err	P	Coefficient	Std. Err	P	Coefficient	Std. Err	P
Mean (μ)									
Rent	0.01544**	0.0021	0.000	0.0028**	0.0005	0.000	0.005**	0.0005	0.000
Guarantee payment	2.1127**	0.4471	0.000	0.9883**	0.2603	0.000	1.0555**	0.1964	0.000
fragmentation	-0.6236	0.3550	0.079	0.0057	0.2192	0.979	-0.3905*	0.1706	0.022
term of contract year	0.5259**	0.1019	0.000	-0.1163*	0.0560	0.038	0.1052*	0.0442	0.017
Collateral right	-0.1091	0.3225	0.735	0.4591	0.1947	0.018	0.2309	0.1399	0.099
Institution	1.6036**	0.4768	0.001	0.0007	0.1957	0.997	0.5298**	0.1607	0.003
Irrigation	-0.0299	0.2715	0.912	-0.1754	0.2292	0.444	-0.0662	0.1390	0.634
Distance to village	0.1896	0.3539	0.592	0.1491	0.2162	0.491	0.2022	0.16007	0.208
Land quality									
middle	-0.2267	0.5076	0.655	0.1718	0.2331	0.461	0.0093	0.1793	0.959
High	1.2030*	0.4801	0.012	-0.0595	0.2443	0.808	0.2537	0.1907	0.183
Land profitability									
middle	1.1496**	0.3414	0.001	-0.2626	0.2163	0.225	0.2217	0.1562	0.156
High	1.1161**	0.3866	0.004	0.1774	0.1991	0.373	0.4725**	0.1598	0.003
SD									
Guarantee payment	2.499**	0.5388	0.000	1.099	0.2920	0.000	1.253**	0.2033	0.000
fragmentation	-0.3781	0.9633	0.695	0.5278	0.2922	0.071	0.483	0.3540	0.172
term of contract year	0.2782**	0.0879	0.002	0.348	0.0776	0.000	0.3462**	0.0563	0.000
Collateral right	-1.3298	0.5298	0.012	-0.3061	0.3235	0.344	-0.2049	0.2272	0.367
Institution	-1.9283**	0.4330	0.000	-0.5835	0.2853	0.041	1.4961**	0.2346	0.000
Irrigation	0.4741	0.3826	0.215	0.9756	0.3104	0.002	-0.5505*	0.2165	0.011
Distance to village	0.4138	0.447	0.352	-0.2138	0.3733	0.567	-0.2759	0.2056	0.180
Land quality									
middle	1.0753	0.5547	0.053	0.4360	0.2655	0.101	-0.0841	0.2830	0.760
High	-2.0912**	0.4910	0.00	0.6312	0.2474	0.011	0.2980**	0.2516	0.000
Land profitability									
middle	-0.1956	0.3882	0.614	-0.3861	0.3637	0.288	0.5795*	0.2485	0.936
High	-0.9594**	0.2767	0.001	-0.1276	0.40	0.752	0.5315	0.2447	0.300
ll(Null)	-311.1826			-495.5895			-926.3562		
AIC	603.7004			999.9867			1775.842		
BIC	727.6745			1121.538			1914.579		

p<0.05, ** p<0.01, *** p<0.001

5.3 Willingness to pay Space

Since the parameter estimated from both the conditional logit and mixed logit models provide little economic information because of the non-cardinal nature of utility, we use the estimated parameters of mixed logit model, setting the rent as fixed parameter, to convert the preference parameters into dollar terms, compute the willingness to pay and the willingness to accept.

The willingness to pay refers to the subjective value of attribute k of alternative j, which is the marginal rate of substitution between attribute k (quality) and money at constant utility. The maximum willingness to pay is the increase in one unit an attribute that provides utility. We divided the coefficients of each attribute as the marginal utility, by the coefficient of rent as the fixed parameter.

5.3.1 WTP Space for rent-in

In this subsection discuss about the results of WTP across our nine attributes, including formal institution, land characteristics. The baseline for price is 500 RMB.

5.3.1.1 Contracting arrangement:

In terms of formal platform, there are the participation of land transfer center and the terms of contract and guarantee payment which indicate the degree of formality in transactions.

5.3.1.1.1 Guarantee payment:

Farmers in Shaanxi indicated that they were willing to pay 277 RMB less if they needed guarantee payment, which meets our expectation. However, respondents in other

provinces revealed opposite preference, perhaps because the guarantee payment also came about with a guarantee on across the land.

In Jiangsu, respondents were even willing to pay more for the guarantee payment, which seems unreasonable. Aside from that, the average total income (including non-agricultural and agricultural income) is 340,366 RMB, suggesting that the more developed economy in Jiangsu Province would provide greater awareness of the value of contracting arrangement.

5.3.1.1.2 The participation of land transfer center

The participation of land transfer center was not a significant factor in the first round of three provinces. However, in the second-round choice experiment, farmers were willing to pay more than the baseline by 87.7027 RMB/mou in Henan, 94.657 RMB/mou in Jiangsu, and \$148.529 RMB/mou in general. There are few studies about the effects of land transfer center on farmers' decisions of whether to rent in or not. This is because land transfer centers were still underdeveloped. In Shandong, nearly 86% of respondents who never heard of land transfer center or heard but were not familiar with their purposes. While in Sichuan and Shaanxi, nearly 84% and 87% of respondents had the same feelings. In terms of the second-round experiment, land transfer centers seem much more developed in Jiangsu Province.

5.3.1.1.3 Term of contract

Respondents in Shandong Province, Henan Province and Sichuan Province, were willing to pay more for a longer term of contract. Especially in Shandong Province, where farmers were willing to pay 139 RMB more for longer terms of contract. In

Shandong, the leading food crops, wheat, corn, soybeans account for most of the total cultivated acreage of the province, which indicates that investors (farmers) need a relatively longer time for getting profits back.

While in Shaanxi and Jiangsu Province, they are willing to pay less to have a longer term of contract: 2 RMB/mou/year in Shaanxi and 6 RMB/mou/year in Jiangsu. The amount is, however, small, which is consistent to the current situations in China. Although some relatively large rural land lease market exists, short-term contract and informal contracts dominated (Zhang, Liu, & Cai, 2018)

5.3.1.2 Land characteristics

The land characteristics examined in this study include the following attributes: fragmentation, distance to village, lot size, access to irrigation facilities, land quality and profitability.

5.3.1.2.1 Land Fragmentation

We present result for rent-in in *Table 21*. Our estimates indicate that respondents were willing to pay about an average of 910 RMB more for concentrated land in the first-round choice experiment. In the second round, respondents were willing to pay 229.03 RMB/mou more for concentrated land. The implied amount of WTP for concentrated field seems more plausible. Respondents in Sichuan were willing to pay extremely higher price, 1155 RMB/mou, for concentrated land. This result is close to our assumptions about farmers' attitudes towards land fragmentation based on the geographic situation of Sichuan Province, they are willing to pay a large amount of rent for concentrated land.

5.3.1.2.2 Distance to village

Respondents were willing to pay 444.86 RMB more for the land, which is close to their home in Sichuan Province, which is consistent with our previous estimate of fragmentation in Sichuan.

The two results of fragmentation and distance to village support each other: increased land fragmentation means household with a more diverse set of parcels in terms of walking distance, slope, elevation and wetness, which lead to decreases in outputs. Also the village layout in Sichuan is sparser than other provinces. For the same reason, additional hours of walking time between lands and home was also estimated to reduce yield, which was consistent with the finding, labor inputs fall as travel increase. The terrain in Sichuan province has land so far away from their home, which make them value more on the distance. Though respondents in other province indicate they are willing to pay a little more for land which is close, they do not put so heavy value on this attribute like Sichuan province.

5.3.1.2.3 Lot size

Respondents are willing to pay 1 RMB to 10 RMB extra for larger land plots, though the amount is small. The fact in China is that an average land allocation is small (approximately 0.65 hectares) and farmers are very used to this kind of small-scale farming. Recently, there have been some studies about the success in expanding farm size and increasing farmers' income (Li, 2016). The evidence for the positive correlation between farm size and productivity is anecdotal. Few empirical studies on this topic use large-scale data to examine the effect of farm size on productivity, let alone farmers'

decisions. They are willing to pay more for extra farm size, however, the small increase on payment indicates that they are also not willing to farm a large size.

However, as discussed in Chapter 2 or the Ricardian rent model, it is not unreasonable to anticipate that farmers would pay more for land in marginal value product of land could be increased through achieving the intensive and extensive margins.

Meanwhile, respondents were willing to pay more for land which has access to irrigation facilities 1060.615 RMB more for land which has access to irrigation facilities and 313.735 RMB more for the second round, which are all significant for the above fields. In terms of land quality and land profitability, respondents are willing to pay extra amount of rent for higher quality and higher profitability. Each coefficient has the expected sign, as respondents' preference in land quality and land profitability.

Table 24 WTP for rent-in

	Shandong	Sichuan	Shaanxi	Total	Henan	Jiangsu	Total
Guarantee payment	10.761	41.7143	-277	-64.0769	43.9456	171.486*	71.9118
Concentrated lot size	671.6739*	1155**	662*	910.6923**	-49.6216	280.2**	229.0294**
term of contract year	2.8043	2.7143	4*	5**	-11.4865	1.8857**	0.8529*
Institution	139.7391*	63.1429	-2	86.9231*	56.6216	-6.6571	-16.2647
Irrigation	-128.7609	22.9048	326	117.462	87.7027*	94.6571	148.529**
Distance to village	760.7826*	650**	818**	1060.615**	-44.5676	352.543**	317.735**
Land quality	156.6304	444.857*	170	336.7692*	98.1892*	212.371**	83.7647*
middle	-430.4348	411.048	619	414.462	-21.2162	107.114	127.441**
High	-23.0435	654.714*	1000*	598.7692**	99.9189*	300.457**	295.471**
Land profitability							
middle	197.3261	337.429	796*	647.6923**	76.0811	10.8857	107*
high	858.6739*	669.762*	1374**	1269.923**	93.0541*	357.971**	372.206**

5.3.2 WTA Space for rent-out

In the *Table 22* labeled WTP Space for rent-out, we report the implied mean of WTA for rent-out.

5.3.2.1 Contracting arrangement

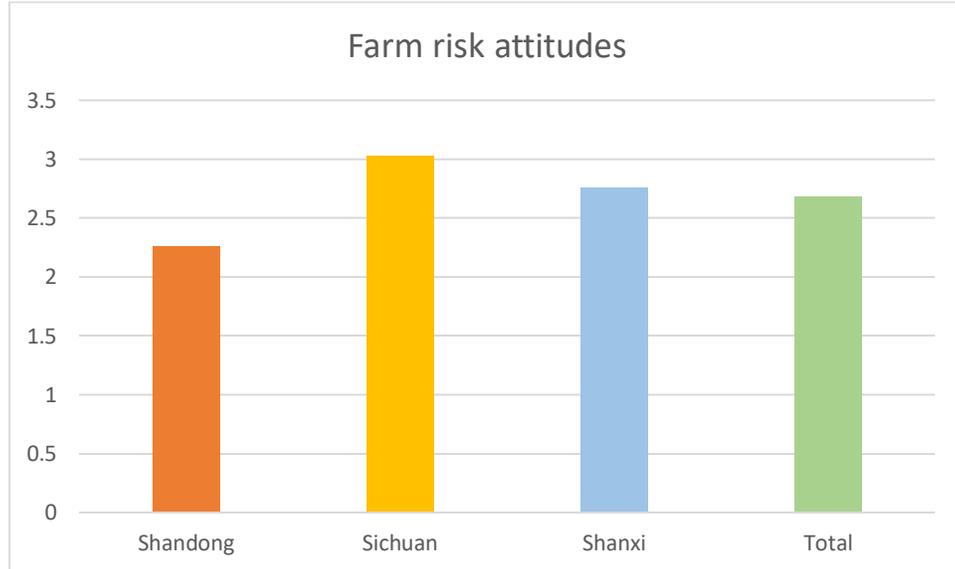
The attributes about contracting arrangements surrounding land rental were also significant in WTA on rent-out, which is consistent with our previous discussions.

5.3.2.1.1 Guarantee payment

In the second-round field experiment, especially in Henan, respondents were willing to accept 353 RMB less to get the option of receiving guarantee payment, which is a significant factor. In Jiangsu, farmers were willing to accept 136.83 RMB less to receive the guarantee payment. Compared to the first-round field experiment, farmers were willing to accept 558.6916 RMB less and 128 RMB less to receive the guarantee payment in Sichuan and Shaanxi Province. However, in Shandong, they were willing to accept more rent to receive the guarantee payment in Shandong, which seems not reasonable.

On the other hand, the lessors may not receive such an unfair condition. However, the small amount of 12.1 RMB indicate that that farmers in Shandong don't actually care much about guarantee payment, since farmers don't have a great or positive attitude towards risk management, which is consistent with our survey result about farmers' scores of risk attitudes presented by Figure 6.

Figure 7 Survey: Farm risk attitudes



5.3.2.1.2 The participation of land transfer center

In rent-out, the land transfer center is an extremely significant in WTA. With the participation of land transfer center, farmers were willing to accept 234.12 RMB less in Shandong, 1307 RMB less in Sichuan, 827 RMB less in Shaanxi for the first-choice experiment, while for the second-choice experiment, farmers were willing to accept 0.25 RMB less in Henan, 103.86 RMB less in Jiangsu. In general, farmers were willing to accept 105.96 RMB less in the second-time choice experiment and accept 1129.29 RMB less for the first time. Land transfer center seems more important for farmer who rent out land. Farmer who rent out land were in the position that seems more economically disadvantaged, so they would want to seek a much fairer platform for transaction, including an implicit guarantee on enforcement of the rental contract.

5.3.2.1.3 Terms of contract

In terms of terms of contract, there are variations across provinces. In Shandong, farmers were willing to accept 34.17 RMB less for longer terms of contract (one-year

unit more). Similarly, in Sichuan and Jiangsu, they were willing to accept 135.14 RMB less and 34.06 RMB less for longer terms of contract. Farmers were willing to require 51.75 RMB and 41.53 RMB more in Shaanxi and Henan for one more year with significance, the amount of changes are not great for one additional unit of years, which seems very acceptable.

5.3.2.1.4 The right to use contract as collateral

The most interesting part of the attributes is the right of using the contract as collateral when you rent out land. In general, it is not a significant for land transfer out in all provinces except Henan. In Henan, farmers are willing to receive 164 RMB less for having such right. It would play a great role in motivating farmers to rent out their land in Henan. There are few literatures or documents to talk about this right and from our survey. From our survey, farmers were not familiar with the right, and it was difficult for them to understand and value this attribute.

5.3.2.2 Land characteristics

5.3.2.2.1 Irrigation facilities

Farmers in the second round were willing to accept higher amount of rent for the land which has access to irrigation facilities. In Jiangsu, most farmers own the irrigation facilities, so respondents would not accept more for this attribute. However, farmers in the first round were willing to accept lower amount of rent if the land which they rented out has access to irrigation facilities, which is unreasonable, but was insignificant according to Logit results.

5.3.2.2.2 Distance to village and fragmentation

The interesting estimate is about the distance to village. The first-round estimates found that respondents were willing to require 358 RMB more for land closer to villages, but respondents also seemed to be willing to accept 40.38 RMB less for land which is closer to villages in Jiangsu. In terms of fragmentation, farmers seem to be willing to accept less money for concentrated land, but not significant (fail to reject the null hypothesis).

5.3.2.2.3 Land profitability and quality

Aside from these attributes, respondents who decide to rent out their land also indicate they are willing to require 293 RMB extra for their middle-quality land and 334 RMB for high-quality.

For the land profitability, they are willing to accept 340 RMB more and 302 RMB more for middle quality and high-quality land, which seems not in the right direction as rent for higher profitability should be higher than that of the middle profitability, but how farmers interpret “quality” is subjective.

In terms of second-round choice experiment, they valued more on land profitability instead of land quality. The estimate of WTA for land profitability was more reasonable. For farmers who rent out land, they “own” such land, they would not consider their land as low-quality if without any obvious or apparent defect, so they would value more on their profitability. The direction of land profitability is consistent in all the fields. Farmers were willing to accept 44.34 RMB more to get middle-profitability land and accept 94.5 RMB to get higher-profitability land. The difference between middle profitability and high profitability is 50.16 RMB for the second time.

Table 25 WTP Space: rent-out

	Shandong	Sichuan	Shaanxi	Total	Henan	Jiangsu	Total
Guarantee payment	12.1	-558.6916	-127.9167	-236	-352.9643**	-136.833**	-211.1**
concentrated	-94.95	-214.86	-273.833	-331.286	2.0357	-40.3886	-78.1*
term of contract year	-34.17	-135.1402	51.75	-138.5714**	41.5327*	-34.0609**	-21.04*
Collateral right	164.022	27.9439	13.63	215	-163.9643*	7.0661	-46.18
Institution	-234.1328*	-1307.383**	-827.5	-1129.286**	-0.25	-103.86**	-105.96**
Irrigation	-46.3358	-108.972	-337	-182.8571	62.6429	1.9365	13.24
Distance to village	89.6679	383.084	116	358	-53.25	-12.2798	-40.44
Land quality							
middle	61.3653	362.617	277	293.286	-61.35714	14.6826	-1.86
High	122.251	12.8972	371	334	21.25	-77.9145	-50.74
Land profitability							
middle	88.56009	398.2263	214.75	340.1429	-93.7857	74.456**	44.34
High	218.4133	256.0748	-91	302.1429	63.35714	72.2863**	94.5

* p<0.05, ** p<0.01, *** p<0.001

5.4 The relationship between rent in (WTP) and rent out (WTA)

From the self-declared survey, the maximum WTP and minimum WTA data obtained from self-declared questions are reported in the *Table 23*. The mean of the minimum WTA price is \$695.19 RMB, while the mean of the maximum WTP price is \$648.92 RMB. The difference is 46.27 RMB, which is consistent with the literature review that WTA is greater than WTP. In our estimate of WTP,

Table 26 WTP and WTA relationship

	The maximum price to pay	The minimum price to accept	Net gain (WTP-WTA)
First time	648.92	695.19	-46.27
Second time	820.40	868.83	-48.43

Figure 7 and Figure 8 below display the equilibrium between WTP and WTA for land rental from first-round and second-round choice experiment results which based on the price coefficients, the similarity is the equilibrium price range is between 700 RMB and 800 RMB.

Figure 8 first-round Marginal utility curve of WTA and WTP (without outliers)

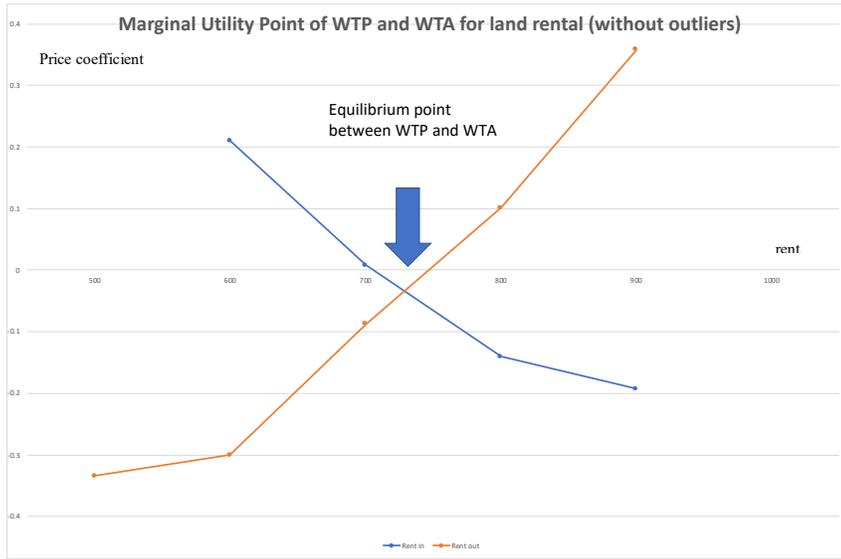
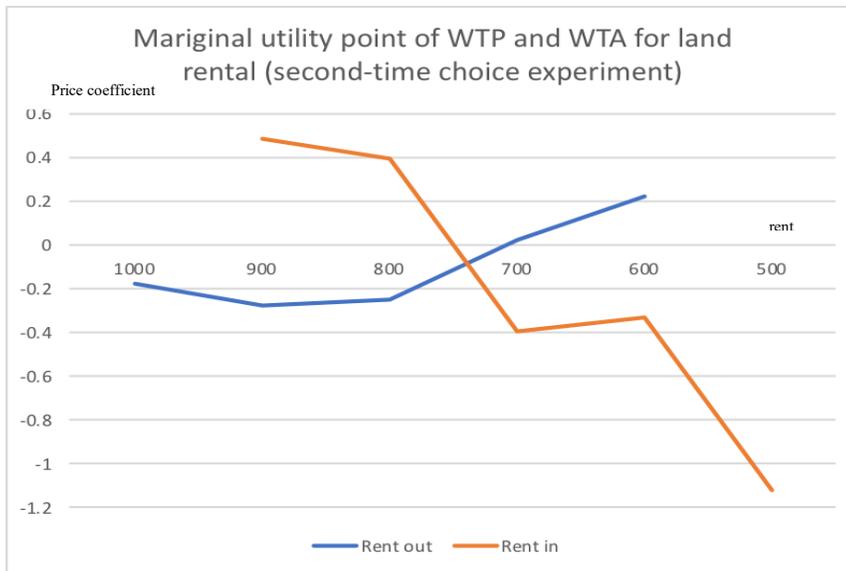


Figure 9 second-round Marginal utility curve of WTA and WTP (without outliers)



At the end of discussion about WTA and WTP, we want to know who dominates in China’s rural land rental market and what the welfare maximize market clearing price might be. According to the Non-Walrasian equilibrium theory (Clower, 1965). The imbalance between supply and demand, especially supply exceeds demand, the market is considered as a “buyer’s” (rent-in) market. Based on the results that the maximum

price to pay is greater than the minimum price to accept, we could conclude that the ‘buyer’ (rent-in) is in the dominant position and the ‘seller’ (rent-out) in the weak position in the rental market, which refers to the “buyer’s” (rent-in) market. There are three main reasons:

One is the high relative income of a farmer getting between non-agricultural and agricultural. In China, the relative income continues to grow (Lin, 2004); (Chen & Lin, 2010). On the one side, many young laborer move to urban areas, leading to increase in rural land use right supply. On the other side, the high relative incomes make farmers reluctant to work in agriculture and thus decreasing the demand for land.

Second, the closed or semi-closed market for land rental, which is based on the close or informal relations instead of the wholly competitive market, would not regulate the imbalance in supply and demand through the price mechanism, which leads to the disequilibrium between supply and demand.

Thirdly, according to the literature (Zhong & Ji, 2009); (Feng, Jiang, Ye, & Zhu, 2013), collective land ownership in rural areas and the regular adjustment of rural land from different farmers have resulted in the instability of rural land ownership in China. When farmers rent-out land, the risks inherent in unstable land ownership rights will be passed on to the farmer who rent in land. Meanwhile, farmers who want to rent-in land would be worried about the risks, which decreasing their willingness to rent-in land, thus strengthening the “buyers’” (rent-in) market (Zhang, Liu, & J. Cai, 2018).

Moreover, some studies (Chen & Lin, 2010) indicated that the income of farm households renting-in is much lower than those of renting-out. Those farmers who have transferred their land and have neither absolute advantage in agriculture, nor

comparative advantage in non-agricultural activities, account of large percentage of land transfer out. The increase in non-agricultural income cannot offset reduction in agricultural income, which is particularly obvious in areas where non-agricultural economy is underdeveloped, the demand for rural surplus labor is limited, and wage level is low. On the other hand, those farmers who circulated in the land have an absolute advantage in agriculture. Though they may not have comparative advantage in agriculture, they are still possibly capable of developing high-quality and high-efficient modern agriculture in the further when they “own” more land and transfer in land.

5.5 Self-declared survey

In the survey part, we asked several questions like “Whether you are willing to pay higher price for concentrated land”, “whether you need to receive a higher price for guarantee payment” to confirm people’s ranking of importance about factors that influence land transaction. Respondents could answer these questions or point Likert scale (from “strongly disagree” to “strongly agree”), from which we average the scores to get the ranking in both rent in and rent out.

For respondents who decide to rent-in land, the first three factors are location of land, land quality and land fragmentation. It is interesting that the same three factors are the most important factors for respondents who decide to rent out land. One of the reasons in the first field experiment is the selection bias for respondents since we randomly chose respondents. Some of the respondents who conduct the experiment about rent out in the first field experiment were actually renting in their land. It might have been difficult to switch their roles or sides in the transaction. Figure 9 and Figure 10 show the importance ranking of attributes in rent-in and rent-out choice experiment.

Figure 10 First-round survey ranking: importance of attributes (rent-in)

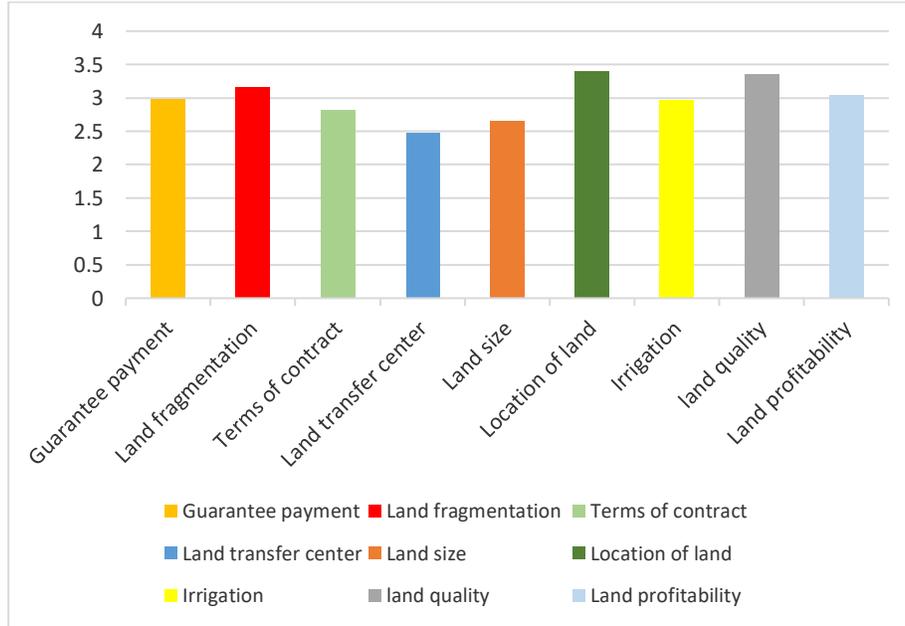
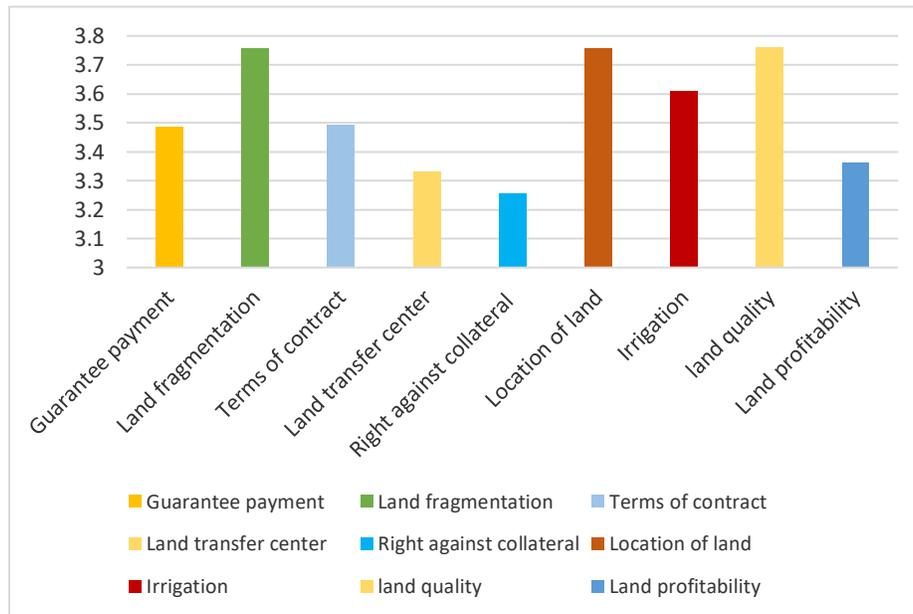


Figure 11 First-round survey ranking: importance of attributes (rent-out)



In the second-round field experiment, we asked several questions like “please rank from 1 to 10 about the importance of attributes of land transfer, 1 is the most important, 10 is the least important”. In Jiangsu, rent is the most important for both rent in and rent

out; for rent out, whether could receive guarantee payment is the second important factor, then land transfer center and soil quality, soil profitability, which are consistent with our choice experiment result. For rent in, the access to irrigation facilities, land profitability and land size are all essential factors for farmers, which are also consistent with our discrete choice results.

The consistency of results in the second-round relative to the first round was a decision in the second round to ensure that the rent-in CE was assigned only to farmers who rented-in land and rent-out to these who rented their land out. This protocol was not applied in the first round.

Figure 12 Survey ranking: importance of attributes in land rent-out, Jiangsu Province

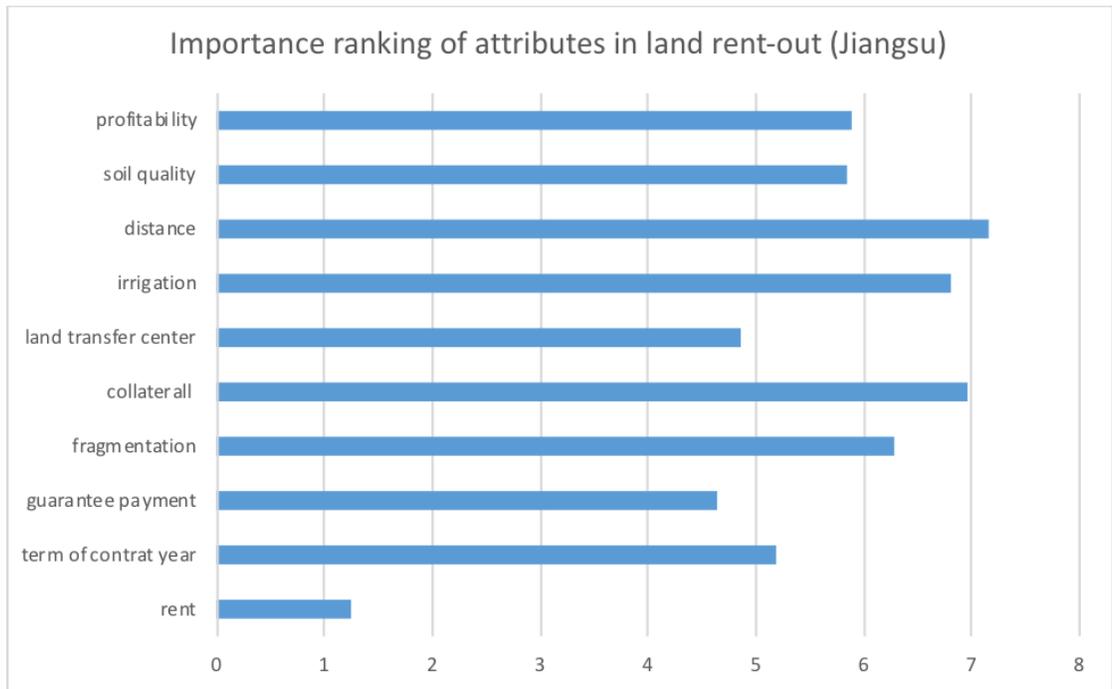
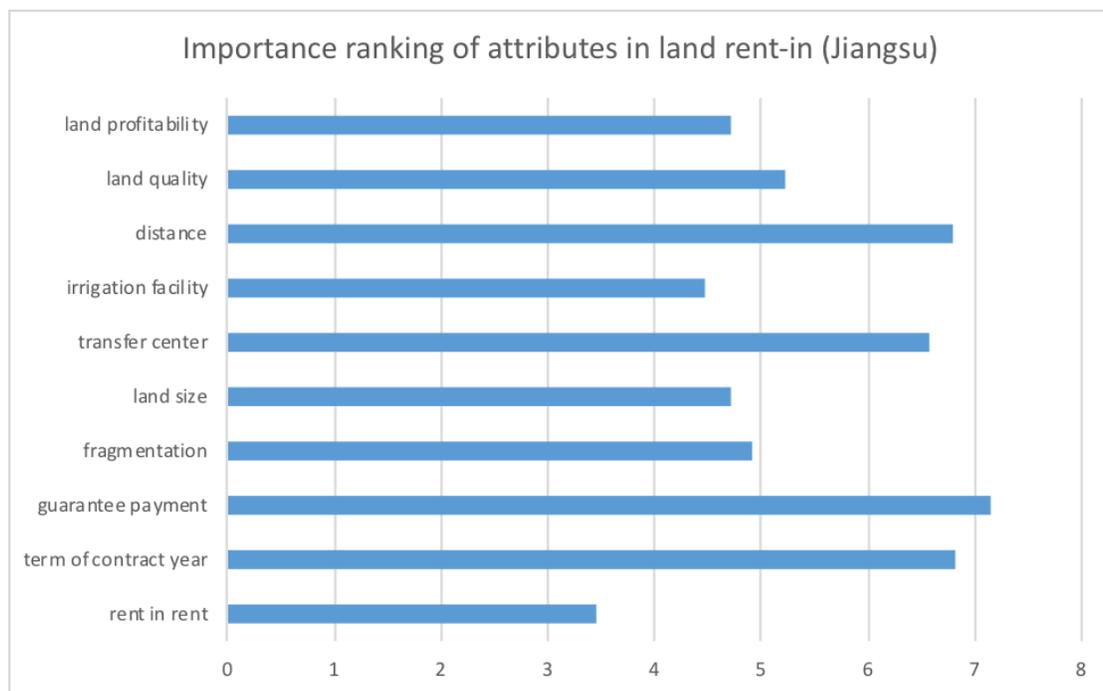


Figure 13 Survey ranking: importance of attributes in land rent-in, Jiangsu Province



In Henan, rent, irrigation and land quality are the first three important attributes when people rent-in land, which are different from that in Jiangsu. While for rent-out, rent and guarantee payment are the most important factors, which are consistent with that of discrete choice experiment.

Figure 14 Survey ranking: importance of attributes in land rent-out, Henan Province

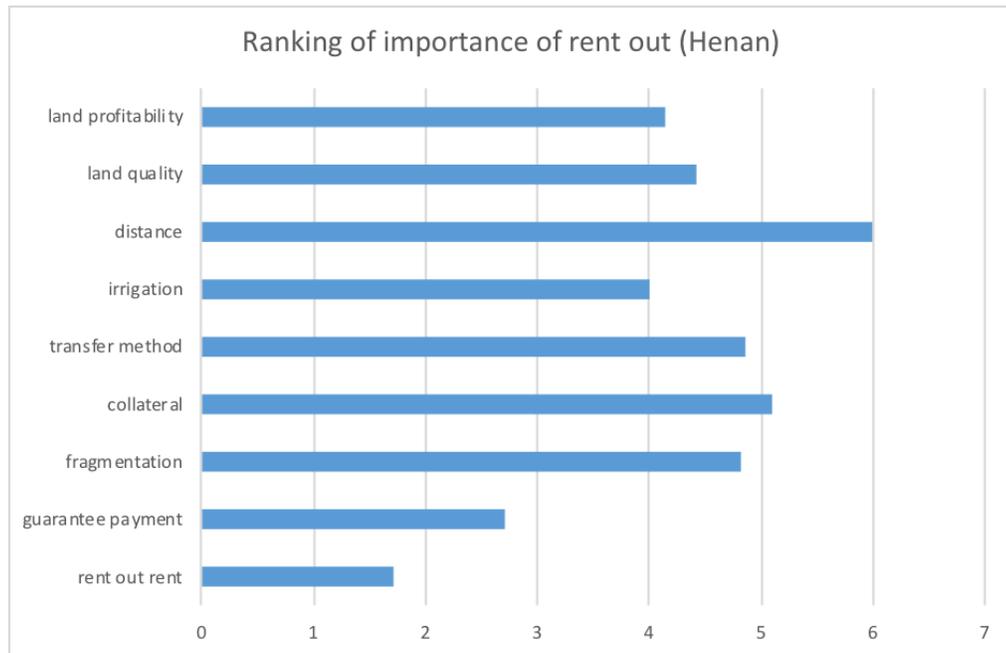
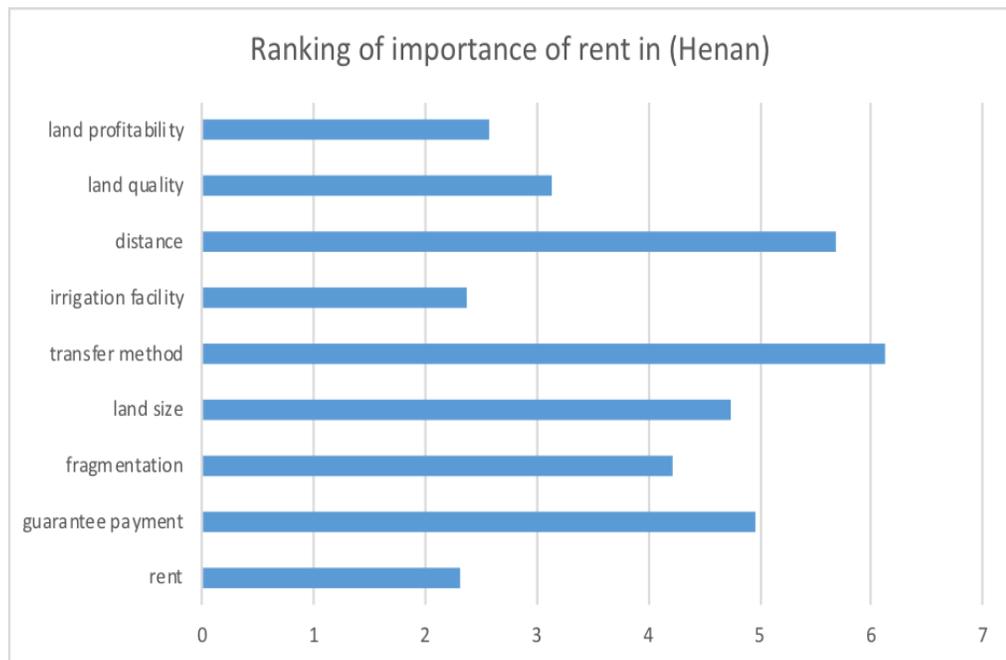


Figure 15 Survey ranking: importance of attributes in land rent-in, Henan Province



5.6 Probability Profile

According to the probability profile graphs below (Figure 15, 16, 17 and 18), demand and supply probabilities of those attributes are price sensitive. First, the demand and supply (rent out and rent in) are consistent with the result of logit models and willingness to pay space, which could confirm the discussions above.

In terms of rent in, we found that the probability curve for lot size, term of contract fluctuates, which indicate that respondents hold different preferences and have different plans about the rent-in land. The peak point for the probability of term of contract is in the middle, which is 3-5 years. The result is consistent with the previous discussions: long-term contract is preferable to its short-term contract, however, in reality, both lessors and lessees tend to prefer short-term lease. So, in this hypothetical choice, respondents prefer to choose the contract which is neither long nor short because they are both worried about the land ownership (property right and use right) instability. The greater size of lot, the high probability respondents choose in the first-round choice experiment, while the peak point of the probability curve of lot size in the second-round choice experiment is 150 mu. The other probability curves of attributes between the first time and the second time are consistent. For rent out, the difference between the first and the second probability curves of distance is consistent with the result from WTA.

Figure 16 Probability profile for rent-in (first round)

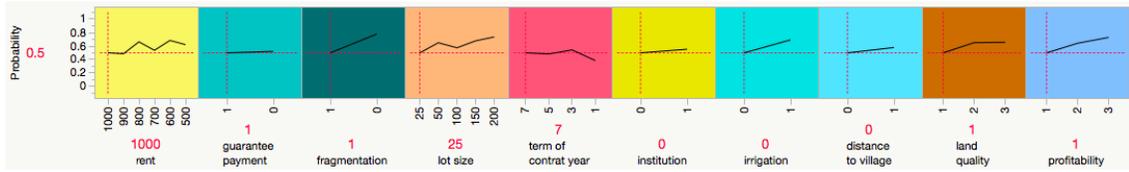


Figure 17 Probability profile for rent-out (first round)

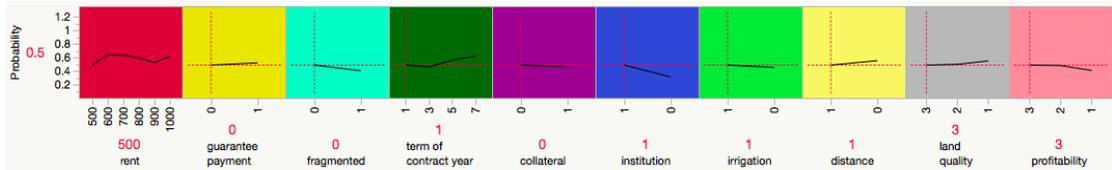


Figure 18 Probability profile for rent-in (second-round)

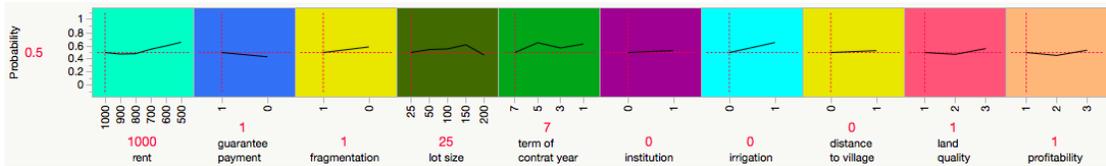
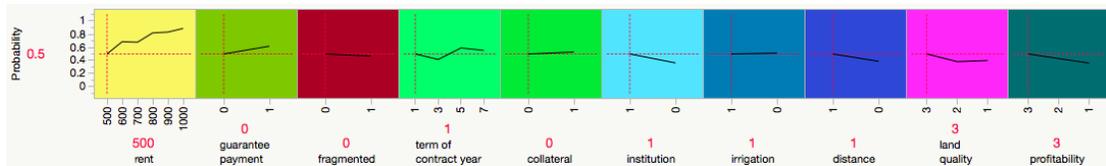


Figure 19 Probability profile for rent-out (second-round)



CHAPTER 6 Conclusion

6.1 Conclusion

A strong legal framework surrounding contracts makes farmers more likely to rent out their land. The improving contract security provides farmers with a more equitable and fair transaction environment. Reductions in transaction costs and more disciplined environment by the strong legal framework surrounding contract together exert greater influences on farmers' decisions on rent out rather than rent in. Because people who rent in are more confident about their rights and profits. The results of this study are consistent with multiple observations that the land market is a buyer's market which refers to that supply exceeds demand. People who decide to rent in have an advantage over farmers who rent out their land in price negotiations.

Though farmers don't have ownership of rural land, China still has a well-functioning farmland rental market where there is a healthy demand for more productive and better-quality (as regards locations, access to irrigation facilities) land. The presence of this demand validates assumptions of Ricardian rent theory in a fully-competitive market, though the land transfer is always influenced greatly by the policy. Farmers' preferences for land characteristics correspond to their unique geographic environments. The variations imply that land transfer design at a macro level cannot be implemented "across the board" and should be tailored to local conditions and policies. The estimates from choice experiments are consistent with other studies using different methods and correspond to the results from household survey.

Land property rights, including ownership rights, contract rights and use rights, they are underdeveloped in current legal framework and require improvements. The

complete land contract and use right ensure farmers who rent in their land the legality of mortgage and inheritance. Farmers can mortgage the land to financial organizations to get the loan which can be invested into agricultural productions. Additionally, the government should guarantee the complete contract right to farmers who rent out as well as issuing them land registration certification. The complete contract rights also increase the stability and security of land use right, which is important for both sides. In order to achieve the complete legal framework regarding land property right, it is necessary to deepen the “separation of the three rights” of agricultural land reform.

In our study, China’s practices indicate that the development of the land transfer system should take the principal agent into considerations. Land transfer is a complex process, involving several main parties and their interests. The application of principal-agent theory in the field, such as the participation of formal intermediate organization like land transfer centers should be used more frequently. Since there are currently not enough such organizations or systems in China, most land transfers are introduced or organized by collective economic groups, village leaders or by other informal arrangements. However, most of farmers and village collectives are not professionals and do not act independently. As a result, it cannot protect farmers’ interests, which leads to an unfair market.

Establishing intermediary systems like land transfer centers could help provide market information and support for evaluation, consultation and transaction. The independence of such system should save money. In sum, the formal system of land transfer could be combined with the informal system, since the formality would give

each side more equitable transaction conditions and eliminate some negative “invisible” factors

The establishment of credit and insurance programs in land transfer should depend on the overall social welfare system and financial support from the state government. It could reduce production risks and encourage people to rent in land. For farmers who rent out their land, it is crucial to establish multi-level insurance funds and develop countryside insurance programs, covering retirement pensions, medical services, disability insurance and the agriculture disaster compensation system. All of these programs can be considered to provide lifetime guarantees for farmers instead of only income from agricultural production, thereby making them less reliant on farm land. Under effective and efficient coordination as well as cooperation among credit and insurance program, farmers’ motivations to rent out their land should be strengthened.

6.2 Innovations and problems in adopting Choice Experiment

Secondly, it is an innovation to adopt choice experiment in order to evaluate the trade-off relationship among these factors. The trade-off choice or decision by farmers would exist more frequently in reality, compared to directly asking respondents which factors are the most important. In China, the variations of land rental price within the same region are few since the government and land institution would give farmers who rent-out land similar price for the policy control, which seems to have less research value.

Additionally, the lack of amount of effective market price data for the incomplete rural land rental market hindered our investigation of actual data, thus the alternative approach, Choice experiment, appears.

Then combined with choice experiment, we could check the consistency between results. The biases from choice experiment can be reduced by the result from questionnaire.

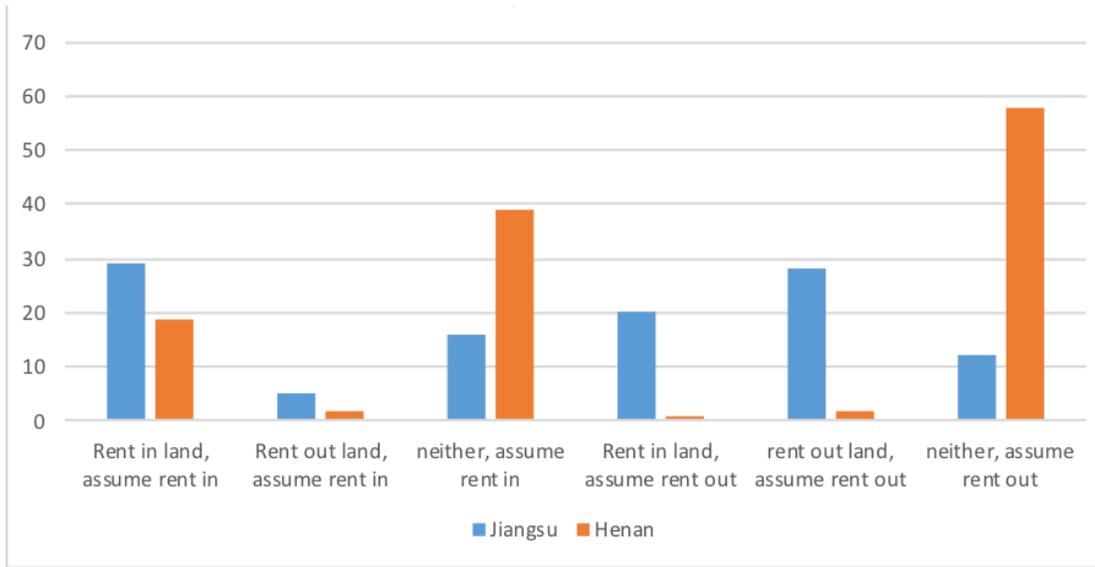
According to Berendsen (2015), the error variance in the utility function varies with the complexity of the choice set and the bigger the choice set, the bigger the error variance. In sum, keeping the number of attributes and levels as small as possible seems more reasonable.

I have chosen 10 attributes with more than 2 levels each. This also increase the required sample size, since the more attributes and level you use, the more respondents you need for significant result (Berendsen, 2015)

The levels of attributes also can affect the parameter estimates (Drummond et al. 2005). Pilot testing, adopting focus group discussions, interviews or surveys to obtain feedback on the attributes' understandings and evaluations, is an essential (Mangham, 2009). Considering in rural China and the translations into Chinese, the confused interpretations might have been overcome by a comprehensive pilot test in advance.

Another common weakness of discrete choice experiment is that farmers were making hypothetical choice that may not perfectly correspond to the choices they would make when decide to rent-in land. This was especially true for farmers who decide to rent-out land. According to the survey data, we found that most farmers in Henan are assuming they are planning to rent-in land or rent out land, however in reality, they didn't.

Figure 20 Hypothetical response for the second-round choice experiment



In sum, we concluded that the discrete choice experiment approach adopted here provides useful information for better understanding about the economics of rental market.

In terms of the proceeding in this area of research, we suggest adopting prior study about the attributes when designing the choice experiment and choosing right target areas with caution. Aside from that, we should consider more about the effect from farmers' knowledge of the policies about the land reform, the advantages and disadvantages of each attributes in the rental market.

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