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Analyses of Topical Policy Issues

Farmers' decision-making regarding land under economic incentives: Evidence from rural China

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ABSTRACT

To achieve complete urbanization in developing countries, it is essential for many farmers to leave rural areas and withdraw from farmland as they enter urban employment. The Chinese government offers economic incentives to encourage households to relinquish their land rights. Based on a survey data in rural China, this paper examines the impact of land transfers and urban housing on the withdrawal of contractual rights of farm households. Econometric analyses reveal that rural households with urban housing are 6.4 % less likely to choose to withdraw from land, whereas those involved in land transfers are 3.8 % more likely to do so. The study's findings suggest that a uniform policy, like nationwide land withdrawal reforms accompanied by economic compensation, might lead to outcomes where the poor lose land and the rich retain theirs.

1. Introduction

As China's rural population becomes more mobile and employment structures change, the contradiction between human and land allocation in agriculture has become increasingly pronounced. On one hand, while China's agricultural GDP share has declined, the number of farm households owning contracted land remains high. This has led to a limited average scale of household land operations and persistently low agricultural labor productivity. On the other hand, many Chinese farmers have migrated from their hometowns and farms, leading to a decreased reliance on agricultural land. In addition, over 40 % of China's agricultural population is aging, and this percentage continues to increase. As the agricultural population ages, the likelihood that farmers will exit agricultural production increases. Given that rational farmers are unlikely to relinquish their contracted land without compensation, the government now prioritizes policy-guided voluntary transfers or compensated withdrawals as key strategies for reallocating land contracted management rights, alongside land expropriation. Farmers' willingness to withdraw from collective land during urbanization is a crucial factor in China's successful urbanization. The flawed withdrawal mechanism for rural land contract management rights not only hampers resource allocation efficiency and population urbanization but also obstructs the realization of the value of farmers' land rights and interests (Wang and Gu, 2023). Our research focuses on how economic compensation influences farmers—who have secured stable employment and living conditions in the city—to relinquish their contracted land amid increasing urban housing ownership and land transfers.

Research on rural contracted land can be summarized into three main aspects. Firstly, some literature focuses on the issue of the

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power scope of rural land contracting rights, defining this scope is the basis for further discussing how to incentivize farmers to withdraw from contracted land. Some scholars argue that farmers should have complete ownership rights over their land, even if they have moved to urban areas (Huang, 2014; Zhou, 2004). Scholars who hold this view believe that farmers' land property rights should be respected, and transactions regarding farmers' withdrawal from rural land should be entirely based on market principles (Zhang, 2011). However, some scholars argue that farmers' contracting rights to agricultural land are based on membership in collective economic organizations. Therefore, the link between non-agricultural employment or urban-migrating farmers and these collective economic organizations has been severed. Hence, they do not support urban migrants retaining their land contracting rights, as doing so could turn them into "absentee landlords" and result in urban areas plundering rural wealth. The other scholars adopt a moderate stance. They believe it is crucial to establish a legal mechanism for voluntary and compensated withdrawal from contracted land in rural areas to ensure farmers' land property rights and freedom of choice.

Secondly, there are also studies on policies that incentivize the withdrawal of rural land contracting rights. As increasing numbers of farmers settle in towns and cities, promoting the transfer of rural land management rights alongside contracted rural land management has emerged as a demand among some farmers and a local practice. Voluntary compensated withdrawal has not only become a common request but also a focal point of rural land allocation research (Gao and Song, 2017). Research indicates that a number of farmers in China are already willing to relinquish their land contract management rights in exchange for compensation (Wang et al., 2016). Understandings vary on the concept of voluntary compensated withdrawal of land contracting rights; while some regions permit withdrawal during the second contracting period, scholars like Dong (2017) argue it should not be confined to this period and advocate for permanent withdrawal options. Encouraging compensated withdrawal of land contracting rights is the primary policy approach of the current Chinese government's land contracting reform. The existing policy plans can mainly be divided into three types: "land-for-cash", "land-for-share", and "land-for-social security" (He and Yang, 2021). On the surface, these policies meet the diverse needs of farmers for land withdrawal. These policies attempt to compensate farmers for the functional value they attribute to the land to incentivize them to withdraw from contracted land (Zhong and Nie, 2012; Huang and Zong, 2014).

Thirdly, some scholars have assessed the policy effects of encouraging farmers to withdraw from contracted land. Following the pilot implementation of contracted land withdrawal compensation, researchers have started to investigate how economic compensation influences farmers' willingness to withdraw from land. Tian and Zheng (2022) found that when the government's economic compensation for farmers is higher than the farmers' ideal expectation for land withdrawal compensation, the implementation of individualized withdrawal policy has a positive effect on farmers' willingness to withdraw from contracted land. However, more studies found that the policies aimed at encouraging farmers to withdraw from contracted land have not achieved their intended goals in practice. The willingness of farmers to withdraw from contracted land is very low (Zou, 2022). The reasons why farmers are unwilling to withdraw from contracted land are quite complex, and it is difficult to understand the true intentions behind farmers' behaviors. These studies suggest that the main reasons why farmers are unwilling to withdraw from contracted land are that land serves as a form of social security; there are various unknown risks associated with land withdrawal; the compensation level for withdrawal is not high, and the problems of policy design (Li and Ye, 2019; Wang et al., 2015a; Luo, 2013; Liu and Niu, 2014).

To enhance the policy effectiveness of contracted land withdrawal, exploring farmers' willingness to withdraw the contracted land, with stable non-agricultural employment and living, has become a frontier issue in improving rural land allocation efficiency and promoting urbanization process in China. Although some studies have started to focus on the policy design of the current pilot program for contracted land withdrawal, research on why farmers are still reluctant to withdraw from contracted land under the paid withdrawal policy and how to enhance the effectiveness of land withdrawal policies in a targeted manner is very scarce.

Compared with existing studies, the marginal contributions of this paper are as follows: (1) For sample selection, our study differs from existing research that primarily focuses on the central and western parts of China. Instead, we collected data from the economically advanced Yangtze River Delta (YRD) region, known for its high level of industrialization. This area is particularly significant as farmers here are more inclined to relinquish their land contracting rights, adding practical relevance to our study. (2) Our research focuses on urban housing as a crucial factor in farmers' willingness to exit contracted land, enabling a deeper analysis of the wealth effects associated with contracted land compensation exit reforms. (3) Our results are surprising, finding potentially unfavorable consequences if a uniform one-size-fits-all farmland compensation exit policy is implemented.

The rest of the paper is organized as follows: In Section 2, we give the institutional background of Rural land reform in China. Section 3 established the analysis model and theoretical framework, and described the link between urban housing, land transfer and household's decision. Section 4 gave the empirical data and methodology, and Section 5 provided empirical results and detailed analysis, while Section 6 concludes.

2. Rural land reform in China

China's land system and urbanization strategy are the important background of the content of this article. It was acknowledged in 1978 that the key to improve the farmer's incentive was to solve the management problem in the team system. China had established the Household Responsibility System (HRS) in rural areas in 1982. This system separated ownership and contract rights successfully. Land in the village was owned by the village collective, and only collective members of the village have the right to contract land, and as long as the household registration does not leave the village, they will enjoy this right for life. By this policy, the government has achieved equalization of land allocation and political stability. Village collectives signed contracts with farmers and distribute rural land to the village collective membership (Zhang et al., 2019). In 1984 the central government issued that land contract period remains stable for 15 years, which called the first-round land contract. In 1997, the central government issued a notice on further stabilization and improvement of the rural contract responsibility system, which declared that the land contract period would be extended for

another 30 years, from 1998 to 2028. This was the new round of land contracts.

With the granting of land use right and residual income to farming households, agriculture shifted from a collective-based to family-based system. Household Responsibility System (HRS) of land reform has achieved great success and remarkable fruits in the past 40 years (Brandt et al., 2002; Deininger and Jin, 2009; Lin, 1991, 1992). Household Responsibility System, which characteristically divided the land among participants equally, has had a series of negative impacts for the development of industrialization, urbanization, and flow of the rural labor force, Small-scale, decentralized, and fragmented farming has been a particular problem (MOA, 2017). In order to promote areas of rural land operated through rental market, the government developed regulations for transferring farmers' operational rights in 2005. Land transfer has gradually increased to become a trend. A large number of studies have shown that land transfer is beneficial to agricultural production and farmers' income in rural China.

After the Third Plenary Session of the 18th CPC Central Committee, the issue of farmers abandoning land contracting rights became an issue. In 2015 The Chinese Government and the State Council issued the "Opinions of the General Office of the State Council on Accelerating the Transformation of Agricultural Development Mode" document, which pointed out that on the basis of adhering to the collective ownership of rural land and fully respecting the wishes of farmers, the rural reform pilot zone will conduct a voluntary pilot abandonment of farmer contracted land, and guide farmers who have stable income from non-agricultural employment and live in urban areas for a long time to voluntarily abandon from land contracting (MOA, 2015).

3. Theoretical and hypothesis

It is a rational decision for farmers to choose to withdraw from their contracted land in exchange for compensation. Based on Todaro's (1969) model, the migration of rural labor to urban areas is influenced by the expected present value of urban versus rural net income. Withdrawing from contracted land means peasants give up their rural welfare benefits and opt for permanent migration and settlement in urban areas.

Due to the difference in urban and rural development, when entering urban life, households will gain welfare benefits $W(t)$[1] generated by the urban-rural development gap, and get compensation EC, while losing the social security value of land $S(t)$. Due to China's special land system, the additional system benefit $I(t)$ resulting from the land withdrawal decision is expressed as: (1)

$$I(t) = W(t) - S(t) + EC \tag{1}$$

The expanded decision-making model for farmers' land withdrawal behavior is:

$$V(0) = \int_{t=0}^{n} [P(t)Y_u(t) - Y_r(t) + W(t) - S(t) + EC]e^{-rt}dt - C(0) \tag{2}$$

Among Eq. (2), $V(0)$ is expected present value of urban and rural household's net income, $Y_u(t)$ and $Y_r(t)$ representing real income in urban and rural areas. $P(t)$ is the accumulation probability of employment. $C(0)$ is the cost of migration from rural to urban. $W(t)$ are urban and rural welfare differences. $S(t)$ is social security value of land. EC is the one-time economic compensation value. As we know farms will migrant if $V(0) > 0$, and will not migrant if $V(0) < 0$.

According to formula (2), it can be derived:

$$\frac{\partial V(0)}{\partial Y_r(t)} < 0 \tag{3}$$

$$\frac{\partial V(0)}{\partial S(t)} < 0 \tag{4}$$

According to Xu et al. (2019), rural labor migration is not only due to the expected income, but also to family risks preference (Xu et al., 2019). Especially in China's special rural-urban dual system, the rural-urban mobility of the labor force not only affected by economic factors but also by relevant institutional factors, such as Hukou system. The exclusion of urban household registration system and public service system, the rural property rights based on collective members are difficult to realize, and the thrust of the city and the pull of the countryside hinder the urbanization process of the farmers entering the city.

According to formula (3), the net income of a household's withdraw from the countryside is negatively correlated with its income in the countryside. Generally speaking, the higher the income level, the higher the probability of the household holding urban housing. Therefore, it can be considered that holding real estate is related to whether it has a negative relationship with the net income of households leaving the countryside. According to formula (4), the net income of households leaving the countryside is negatively correlated with the value of land security. The greater the security value and economic importance of the land to the farmer, the less likely the farmer is to transfer the land and instead choose to farm it personally. Therefore, the net income of households leaving the countryside can be considered there is a negative relationship between income and land circulation.

Based on the analysis above, we have two hypotheses as follows:

Hypothesis 1. Households that own urban housing show less willingness to relinquish land compared to those without urban

[1] Such as the convenience of public transportation and medical care.

housing.

Hypothesis 2. As the degree of land transfer increases, households exhibit a stronger willingness to withdraw from collective land.

4. Data and methodology

4.1. Data

The data in this article are derived from a micro face-to-face survey conducted in the Yangtze River Delta, which is among the most economically developed regions in China, where households are wealthier than in other parts of the country. The questionnaire variables include household characteristics, housing information, land contract details, and households' willingness to dispose of land. The selection of areas and villages was not entirely random. The dataset comprises 1382 observations; Shanghai accounts for 83.72 % of the sample. The sample distribution includes Jiading District (4.25 %), Fengxian District (1.87 %), Baoshan District (4.25 %), Chongming County (5.01 %), Songjiang District (9.43 %), Pudong New Area (25.15 %), Jinshan District (19.46 %), Minhang District (3.74 %), and Qingpu District (4.25 %) — totaling 9 districts and counties. Other samples primarily come from Jiangsu Suzhou (5.43 %), Huzhou, Zhangjiagang, and other areas (see Fig. 1). Overall, the survey samples adequately reflect the status of farmers in the developed areas of the Yangtze River Delta.

4.2. Data description

The distribution of land area for the sampled households is shown in Fig. 2. According to the survey, the average contracted arable land area per household amounts to 2.99 Mu.[2] Since the survey area in this article is one of the most developed in China, a significant amount of agricultural land has been converted to urban land. Consequently, the average farmland area per household is significantly smaller than that reported in national surveys.[3]

As shown in Table 1, households with urban housing are more likely to retain their land contract rights. 75.04 % of households intend to keep their land contract rights, compared to 64.49 % of those without urban housing. Similarly, households without urban housing are more likely to relinquish their land rights compared to those with urban housing. Land transfer implies farmers' dependence on land for survival. According to the statistics in Table 1, households that transferred all of their land are more likely to give up their land rights, with 38.64 % of this subsample doing so, compared to 34 % of those with no transfers and 28 % of partially transferred farmers.

4.3. Statistical evidence

This section provides statistical evidence derived from the survey data. Fig. 3(a) illustrates the relationship between income level and perceptions of land security. The data reveal that 72.63 % of high-income individuals perceive land as social security, compared to only 52.41 % of low-income individuals. High-income earners show a greater recognition of land as security.

Fig. 3(b) depicts the perceived relationship between land transfer and land security. Analysis shows that 68.46 % of households that have not transferred land consider it social security, whereas only 47.25 % of those who have transferred land share this view. This knowledge gap could be a significant factor in the decision to transfer land.

Fig. 3(c) demonstrates the relationship between perceptions of land security and decisions to withdraw from land contracts. Data indicate that 55.17 % of households that consider land security guaranteed intend to retain their land contract rights, while only 36.96 % of those who do not see land as secure plan to retain these rights. Additionally, the proportion of households opting out of land contracts is lower among those who view land as secure (25.45 %) compared to those who do not (44.05 %).

4.4. Variable setting

In alignment with the study's objectives, the variables used in the empirical analysis are as follows:

The dependent variable is households' willingness to withdraw from land contract rights. The survey question asked was: "Are you willing to withdraw from the land contract right in exchange for compensation?" Responses were categorized as follows: 1 = Unwilling to withdraw from the land contract for a fee, 2 = Unsure about exiting the land, 3 = Willing to withdraw from the land contract for a fee. The responses to this question serve as the dependent variable. In the survey sample, 49.32 % of households are unwilling to withdraw from land, 27.40 % of the households are unsure about exiting the land and 23.29 % of households are willing to withdraw from land.

The independent variables include urban housing and land transfer. Urban housing is a proxy for household wealth, and the relevant survey question was: "Does your family own housing in the city?" Answers were categorized as 1 = Yes, owns urban housing; and 0 = No urban housing. The survey question addressing land transfer asked: "Has your family's land been transferred?" Answers were classified into three categories: 1 = No land transfer, 2 = Partial land transfer, 3 = Complete land transfer. In the survey, the

[2] Mu is the traditional Chinese land area measurement unit, 1 acre = 6.0702846336 Mu.

[3] We use the Chinese Family Database (2017) to find that the average arable land area per household is 7.07 Mu at the national level.

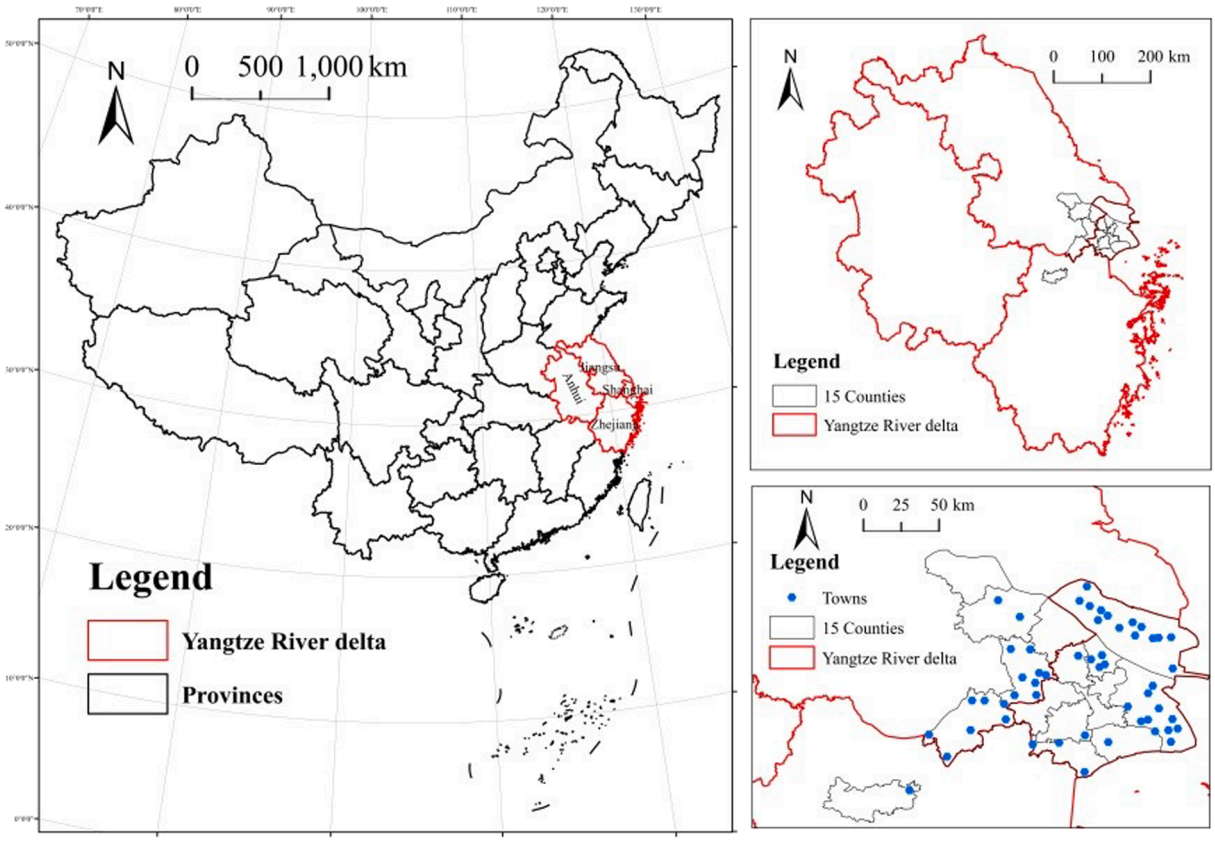

Fig. 1. Geographic distribution of the survey sample.

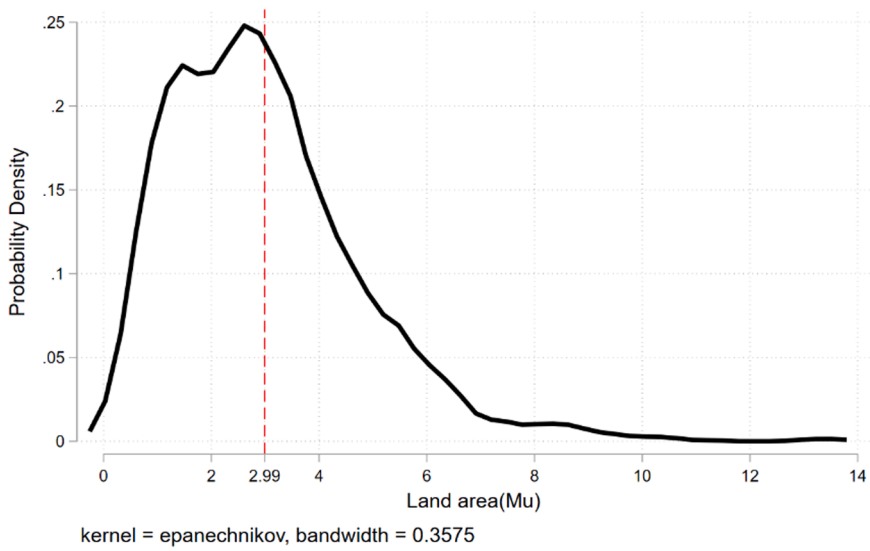

Fig. 2. Distribution of land area of sample farmers.
Source: Calculated from the household survey data from rural China.

sample with urban housing accounted for 42.32 %, the sample without land transfer accounted for 13.05 %, the households with part of the land transfer accounted for 31.87 %, and the total land transfer accounted for 55.08 %.

Drawing on previous research into factors influencing farmers' willingness to withdraw from land contract rights, this study

Table 1
Statistics of urban housing, land transfer and households' willingness to withdraw from land.

Category	Type	Percentage of Households' Selection (%)	
		Reserve of land contract rights	Withdraw of land contract rights
Urban Housing	No urban housing	64.49	35.51
	Own urban housing	75.04	24.96
Land Transfer	No transfer	43.29	34.15
	Partial transferred	43.19	28.02
	All transferred	40.41	38.64

Source: collected by the author in 2016, the sample size is 1382.

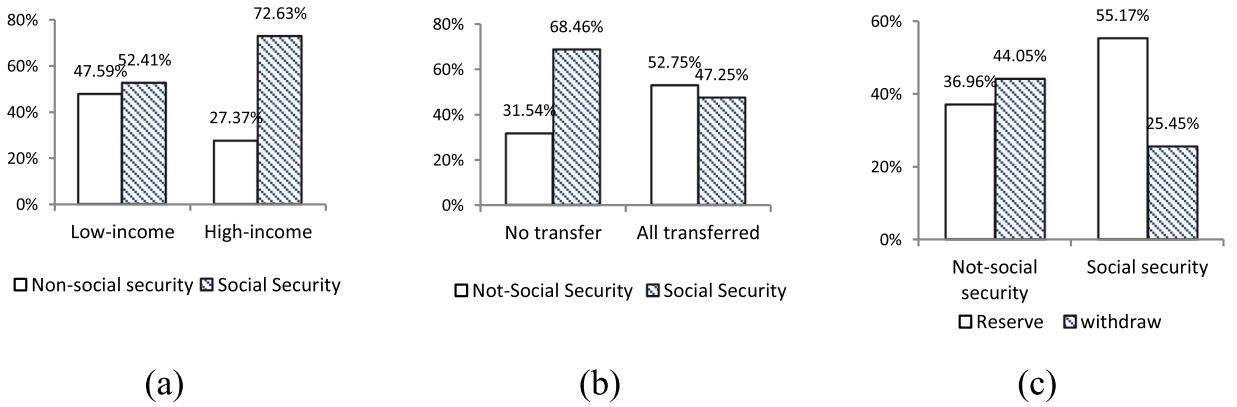

Fig. 3. Income, land security and land withdraw.
Source: the rural household survey data around China Yangtze River Delta

includes various household and land characteristic variables as controls. Household characteristic variables include the gender, age, education level, family size, income level, and car ownership of the household head, among others. Land characteristic variables include land area, land certificate presence, and the number of names on the land certificate.

Table 2 provides the names and definitions of all the variables used in this study.

4.5. Model specification

According to Schultz's (1964) "Rational Small Farmer" theory, farmers are production units that are proficient in calculations, and their decision-making on farmland withdrawal is an extremely complicated process and faces economic trade-offs. This section further

Table 2
Definitions and descriptive statistics of the variables.

Type	Variable	Definition	Mean	Std. Dev
Dependent variable	Willingness to withdraw form Land contract rights	Unwilling to withdraw =1; uncertainty=2; willing to withdraw =3	2.163	0.873
Independent variable	Urban housing	Own urban housing=1; No urban housing=0	0.423	0.494
	Land transfer	No land transfer=1; partial transferred=2; all land transferred=3	2.418	0.714
Household characteristics	Head's gender	Gender of the head of the household	0.665	0.472
(Control	Head's age	The age of the head of the household	2.579	0.949
variable)	Education	Household's head education level, lower than junior high school=1; junior high school=2; high school=3; college and above=4	2.520	1.010
	Family size	Family population	3.882	1.294
	Income level	Annual household income (Yuan/year), <30,000=1; 30,000 to 50,000=2; >50,000=3	2.568	0.677
	Private car	Have a private car=1; no private car=0	0.451	0.498
Land characteristics	Land area	Household contracted farmland area	2.990	1.774
(Control	Land certificate	Have a contract certificate=1; no contract certificate=0	0.919	0.273
variable)	Certificate Num	Number of people on the contract certificate	3.185	1.306
	Financial compensation for withdrawal	The compensation level is incremented by A, B, C, D and E	3.404	1.615

sets up the econometric model needed for empirical testing. The identification strategy based two facts: On the one hand, if a household own urban housing, it means that the farmer's family is richer, and it is less likely to choose to withdraw from the land contract rights in exchange for economic compensation. On the other hand, if the farmers transfer more land, their economic dependence on the land is lower and the more likely they are to withdraw from the land contract rights. In order to test the above hypothesis, this article establishes the following econometric model:

$$y_i = \alpha_i + \beta_{i1} housing_i + \beta_{i2} tranfer_i + \gamma_i X_i + \varepsilon_i \tag{5}$$

In model (5), Where i indexes rural household, the explained variable y_i show the willingness of household i whether withdraw from collective land contract rights, which assigned to 1 if the household unwilling to withdraw from the land contract rights, assigned to 2 if the household is not sure, assigned to 3 if the household willing to withdraw from the land contract rights. $housing_i$ is the first core explanatory variable, which denotes whether the farmer owns housing in the urban. Housing is an important wealth variable, which implies the wealth of households. In addition, housing area and income can also measure the wealth of a family. If the household has a house in the city, define housing as 1, otherwise it is 0. $tranfer_i$ indicates whether the household's land is transferred, if all the land is transferred, it is defined as 3; if part of it is transferred, it is defined as 2; if it is not transferred, it is defined as 1. α_i are the household fixed effects, and X_i are other household factors that affect the explained variable, such as household head gender, age, education level, family size, income, and land property characteristics.

To examine the interaction effects of urban housing and land transfer on households' willingness to withdraw from land contract rights, the identification method is as following model (6):

$$y_i = \alpha_i + \beta_{i1} housing_i \times transfer_i + \gamma_i housing_i + \delta_i transfer_i + \gamma_i X_i + \varepsilon_i \tag{6}$$

It is worth mentioning that because the explained variable is a categorical variable, we uses an ordered probit model in the regression analysis. In some analysis, the explanatory variables are simplified into binary variables, and the probit model is used for analysis. Most of the control variables used in econometric regression is categorical variables.

5. Empirical results

5.1. Preliminary estimation

Based on the extended theory of Todaro Model analyzed above, this article empirically analyzes the impact of urban housing and land transfer on farmers' willingness to withdraw from rural collective land. Meanwhile, we test the interaction effects, analyzing the dependence influence of urban housing and land transfer. The empirical results show that urban housing have negative effects on land

Table 3
Preliminary estimates of the effect of urban housing and land transfer on households' willingness to withdraw from contract land rights.

VARIABLES	Willingness to Withdraw form Land Contract Rights							
	Toal Observations				Shanghai Observations			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Urban housing	−0.106***		−0.086**	−0.064**	−0.121***		−0.083*	−0.066**
	(0.025)		(0.038)	(0.027)	(0.027)		(0.042)	(0.031)
Land transfer		0.044**	0.052**	0.038**		0.053**	0.058**	0.047**
		(0.020)	(0.025)	(0.018)		(0.021)	(0.027)	(0.019)
Head's gender			0.111***	0.072***			0.096**	0.066**
			(0.036)	(0.025)			(0.040)	(0.029)
Head's age			−0.069***	−0.055***			−0.064**	−0.052***
			(0.023)	(0.017)			(0.027)	(0.020)
Education			−0.047**	−0.034**			−0.056**	−0.040**
			(0.023)	(0.017)			(0.027)	(0.020)
Family size			0.015	0.008			0.016	0.012
			(0.016)	(0.011)			(0.018)	(0.013)
Income level			−0.037	−0.030*			−0.055**	−0.041**
			(0.025)	(0.018)			(0.027)	(0.019)
Land area			0.002	0.001			0.000	0.000
			(0.004)	(0.004)			(0.004)	(0.004)
Land certificate			0.024	−0.011			−0.118	−0.100*
			(0.069)	(0.046)			(0.083)	(0.054)
Certificate Num			0.036**	0.031***			0.071***	0.056***
			(0.015)	(0.011)			(0.019)	(0.014)
Observations	1382	1232	919	1203	1157	1009	757	985
Pseudo R-squared	0.0104	0.00336	0.0360	0.0178	0.0134	0.00493	0.0519	0.0265

Note: The average marginal effects are reported in the table. All numbers in parentheses are robust standard errors. ***, ** and * represent statistical significance at 1 %, 5 %and 10 %, respectively.

withdrawal willingness, and land transfer shows positive effects.

The explained variable in baseline model is binary, indicating whether households are willing to withdraw the rural collective land right, meaning permanent migration to the city. The key explanatory variable conclude households' Urban Housing and Land Transfer, and other control variables.

The estimated results of the baseline model are reported in Table 3, presenting the average marginal effects. Regression analysis in columns (1) through (4) encompasses all observation samples. In the regression, if the household is willing to relinquish their rural land, the explained variable y_i is assigned a value of 1; otherwise, it is 0. In comparison, the regressions in columns (5) through (8) are based on the Shanghai sample. The regression result in column (1) indicates that households with urban housing are more reluctant to withdraw from rural collective land, in a model without control variables. Similarly, column (2) reveals that a higher degree of land transfer correlates with a lower willingness to withdraw from rural land. In columns (3) and (4) of Table 3, we control for both household characteristics and land variables. Column (3) is based on observations from respondents who explicitly stated their willingness to withdraw from land, as opposed to choosing ambiguous responses, indicating significant and robust coefficients for urban housing and land transfer. Given that households had three response options regarding the economic exchange for their rural land—explicit withdrawal, uncertainty, and refusal, which represent a spectrum of attitudes—we analyzed the impact of relevant variables on these attitudes using an ordered probit model in column (4). The results indicate that the probability of households with urban housing withdrawing from land is 6.4 % lower than that of households without urban housing. Households that have transferred land are 3.8 % more likely to withdraw from the land compared to those without any land transfer. To verify the robustness of the results, we replicated the regression using the Shanghai sample, which may offer more non-agricultural job opportunities and greater labor mobility. The results presented in columns (5) through (8) remain robust.

5.2. Urban housing effects

Urban housing significantly influences household land decisions through various mechanisms. Firstly, owning urban property often correlates with higher income levels, leading households to value the potential future premium of land, creating a wealth effect. Secondly, urban housing can diminish the social insurance value of land, making households more inclined to relinquish their land contract rights, an effect known as the insurance effect. This section delves deeper into the impact of urban housing on land decisions, with findings detailed in Table 4.

We conducted four distinct econometric regression tests from different perspectives. Initially, we replaced the urban housing dummy variable with the housing area variable, and assessed the relationship using samples that provided urban housing information,

Table 4
The influence of urban housing on household collective land decision.

VARIABLES	Willingness to Withdraw form Land Contract Right				
	(1)	(2)	(3)	(4)	(5)
Housing area	−0.001*				
	(0.000)				
Urban housing				−0.045	−0.066*
				(0.028)	(0.038)
Private car		−0.094***	−0.120***	−0.083***	−0.105***
		(0.027)	(0.037)	(0.028)	(0.039)
Land transfer	0.035	0.034*	0.039*	0.039**	0.048**
	(0.037)	(0.017)	(0.024)	(0.018)	(0.024)
Head's gender	0.167***	0.077***	0.114***	0.077***	0.115***
	(0.044)	(0.025)	(0.036)	(0.025)	(0.036)
Head's age	−0.058*	−0.051***	−0.061***	−0.050***	−0.062***
	(0.033)	(0.017)	(0.024)	(0.017)	(0.024)
Education	−0.071**	−0.025	−0.033	−0.022	−0.030
	(0.032)	(0.017)	(0.024)	(0.017)	(0.024)
Family size	0.012	0.012	0.017	0.013	0.018
	(0.019)	(0.011)	(0.016)	(0.011)	(0.016)
Income level	0.003	−0.025	−0.027	−0.021	−0.020
	(0.040)	(0.018)	(0.025)	(0.018)	(0.025)
Land area	0.004	0.001	0.001	0.001	0.001
	(0.013)	(0.004)	(0.005)	(0.004)	(0.005)
Land certificate	0.107	−0.010	0.014	−0.010	0.018
	(0.066)	(0.046)	(0.069)	(0.046)	(0.069)
Certificate Num	−0.000	0.030***	0.036**	0.029***	0.035**
	(0.022)	(0.011)	(0.015)	(0.011)	(0.016)
Observations	419	1203	919	1203	919
Pseudo R-squared	0.0543	0.0201	0.0383	0.0211	0.0406

Note: The average marginal effects are reported in the table. All numbers in parentheses are robust standard errors. ***, ** and * represent statistical significance at 1 %, 5 %and 10 %, respectively.

detailed in the corresponding column (1). The coefficient of housing area is significantly negative, indicating that the larger the housing square is, the lower the households' land withdraw willingness is; In other words, the richer the family are, the more land they like to hold. Urban housing is a proxy variable of wealth; the results show that the richer the family are, the smaller the marginal benefit of certain economic compensation is. Due to the uncertainty of land institutions in future China, there are many expectations about rural land premium, once the policy is biased towards rural areas. Under this background, land holders need to weigh the pros and cons based on their own circumstances. Family wealth is the most important factor. Secondly, by comparison, households with urban housing tend to be wealthier and are more likely to take risks. In regression of column (2), we exploit the private car as a measurement of family wealth. We find that households with cars are more reluctant to withdraw rural collective land and to migrate to urban. Thirdly, column (3) shows the results of repeated examination with car ownership using the sample who explicitly answered their choice. The coefficient of Private car shows significant and positive. Those results are consistent with previous theories that wealth could impact household attitudes. Lastly, in columns (4) and (5), we test the theory again after including urban housing variable, and the coefficients value of urban housing dropped significantly. The explanation of results (4) and (5) is that Private cars can largely replace urban housing and reduce the cost of living for farmers.

5.3. Land transfer effects

Land transfer is currently one of the most effective methods for improving the efficiency of land resource allocation. Undoubtedly, land transfer significantly influences farmers' willingness to relinquish their land rights. Consequently, this section offers an in-depth analysis of how land transfer affects land withdrawal.

Table 5 presents empirical results of the land transfer effect on the households' decision, which introduced two new variables, land insurance value and responsibility function. The regression result in Column (1) of Table 5 interpreted the different levels of land transfer influence on household attitudes toward withdrawing land rights. We Assigned variable land transfer to 1, if the household transferred their land completely;Otherwise, land transfer is equal to 0. The coefficient of land transfer is significant at 1 % level, which means that compared with households whose land is not transferred or partially transferred, households whose land is fully transferred are even more reluctant to withdraw from the collective land. Column (2) shows the willingness of the land to be withdrawn from the households whose land is fully transferred relative to the partially transferred households. The results are still significant, indicating that households with total land transfer are more willing to withdraw from the collective land than the partial transfer of land. In the column (3), we use the households whose land is partially transferred as the control group, and study the households who did not release land. The results showed that the difference in land withdrawal intention between the two types of households was not

Table 5
The impact of land transfer on households' land withdrawal willingness.

VARIABLES	Willingness to Withdraw form Land Contract Right						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Land transfer	0.095***	0.112***	0.042	0.061**			
	(0.035)	(0.039)	(0.056)	(0.026)			
Security					−0.164***		−0.208***
					(0.028)		(0.029)
Responsibility						0.045*	0.118***
						(0.026)	(0.029)
Urban housing	−0.090**	−0.124***	0.011	−0.057**	−0.160***	−0.140***	−0.154***
	(0.038)	(0.039)	(0.062)	(0.027)	(0.023)	(0.024)	(0.023)
Head's gender	0.108***	0.100***	0.074	0.068***	0.062***	0.066***	0.063***
	(0.036)	(0.038)	(0.054)	(0.025)	(0.023)	(0.023)	(0.023)
Head's age	−0.070***	−0.082***	−0.034	−0.055***	−0.022	−0.021	−0.029*
	(0.023)	(0.025)	(0.037)	(0.017)	(0.015)	(0.015)	(0.015)
Education	−0.049**	−0.051**	0.005	−0.036**	0.002	−0.004	0.002
	(0.023)	(0.025)	(0.037)	(0.017)	(0.014)	(0.014)	(0.014)
Family size	0.015	0.009	0.049**	0.010	0.033***	0.034***	0.030***
	(0.016)	(0.017)	(0.024)	(0.011)	(0.010)	(0.010)	(0.010)
Income level	−0.036	−0.042	−0.071**	−0.031*	−0.031*	−0.055***	−0.037**
	(0.025)	(0.028)	(0.034)	(0.018)	(0.017)	(0.017)	(0.017)
Land area	0.002	0.002	−0.023	0.002	0.005	0.013*	0.007
	(0.004)	(0.004)	(0.017)	(0.004)	(0.004)	(0.007)	(0.006)
Land certificate	0.025	0.008	0.091	−0.007	0.019	−0.016	0.013
	(0.069)	(0.074)	(0.106)	(0.045)	(0.038)	(0.040)	(0.038)
Certificate Num	0.037**	0.042**	0.018	0.031***	0.001	−0.008	0.004
	(0.016)	(0.017)	(0.027)	(0.011)	(0.010)	(0.010)	(0.010)
Observations	919	798	396	1203	1345	1345	1345
Pseudo R-squared	0.0383	0.0468	0.0273	0.0181	0.0443	0.0315	0.0506

Note: The average marginal effects are reported in the table. All numbers in parentheses are robust standard errors. ***, ** and * represent statistical significance at 1 %, 5 %and 10 %, respectively.

significant. In regression of column (4), we use the hierarchical data information of explained variable, dividing farmers' attitudes into three categories, and the results show that land transfer is still significant at 1 % level. Based on the above analysis, households with a high degree of land transfer are more willing to withdraw from the land. Land transfer behavior represents the extent to which farmers are economically dependent on the land, and the more land is transferred, the weaker the farmers' dependence on land. To study the impact of land dependence on land withdrawal intention, we introduced two new variables in the latter regression, which reflect the role of land on households. Protection cognition is a binary variable, assigned to 1 if the households think that land is social security; Otherwise, it is 0.

Similarly, if households believe that land is a social responsibility, set Responsibility to 1. Column (5) means that if households think land as a role of life security, their withdraw willingness will decline. The results further confirmed the conclusion above that land dependence matters when households make decision of land withdraw. If the farmer believes that the land is an obligation, we can think that the farmer's dependence on the land is weak. We test the relationship between land responsibility and lands withdraw willingness, and estimation in column (6) shows that if households think land as a role of obligation, their willingness to withdraw the land will raise. Finally, we put all the two variables into the regression equation, and the results are shown in column (7). The coefficients of security and responsibility are both significant at the 5 % level.

5.4. Interactive effect

The analysis above examined the urban housing and land transfer effects on household attitude towards withdraw collective land right, respectively. An important potential problem is whether there is an interaction between the two explanatory variables. In this part, we study the relationship between urban housing and land transfer and the interaction effects on land withdraw inclusion of an interaction variable in the baseline regression equation, results see in Table 6. In column (1), we firstly test the relationship between urban housing and land transfer, using the land transfer as explained variable to regression. Results show that there are positive relationships between urban housing and land transfer, which means an indicator of short-term labor movement, but not clear the causal direction. The coefficient shows significant and stable after incorporating control variables in column (2). Due to the existence of urban housing, the cost of living in urban areas after land transfer will be reduced, so land transfer will increase. To examine the interaction effects of urban housing and land withdraw, our regression included the interaction term in the baseline equation and the results shown in column (3) Table 6. As the coefficient of interaction term is significantly negative, the results indicate that compared to households with urban housing, land transfer has a greater impact on the households without urban housing of the land withdraw

Table 6
Estimation of interaction effects between urban housing and land transfer.

	Land Transfer		Land Withdrawal		
VARIABLES	(1)	(2)	(3)	(4)	(5)
Urban housing	0.210***	0.196***		−0.105***	0.267**
	(0.028)	(0.031)		(0.037)	(0.112)
Land transfer			0.296***		
			(0.084)		
Urban housing × Land transfer			−0.324**		
			(0.146)		
Head's gender		0.006	0.202***	0.091**	0.044
		(0.032)	(0.070)	(0.036)	(0.078)
Head's age		−0.000	−0.149***	−0.063**	−0.030
		(0.021)	(0.047)	(0.025)	(0.046)
Education		0.061***	−0.107**	−0.065***	−0.069
		(0.020)	(0.046)	(0.024)	(0.054)
Family size		−0.009	0.033	−0.002	0.033
		(0.014)	(0.030)	(0.015)	(0.037)
Income level		−0.034	−0.087*	−0.010	−0.015
		(0.021)	(0.049)	(0.027)	(0.044)
Land area		0.042***	0.003	0.004	−0.013
		(0.010)	(0.010)	(0.004)	(0.028)
Land certificate		0.034	−0.024	−0.010	0.071
		(0.054)	(0.111)	(0.067)	(0.075)
Certificate Num		−0.018	0.079**	0.046***	0.022
		(0.015)	(0.031)	(0.016)	(0.033)
Cut point 1			−0.592**		
			(0.288)		
Cut point 2			0.032		
			(0.287)		
Observations	1232	1203	1203	660	158
Pseudo R-squared	0.0302	0.0542	0.0210	0.0314	0.0329

Note: The average marginal effects are reported in the table. All numbers in parentheses are robust standard errors. ***, ** and * represent statistical significance at 1 %, 5 %and 10 %, respectively.

attitude. In other words, since the land can be transferred, households with urban housing are more likely to transfer land other than to withdraw rural land permanently. In order to further study the heterogeneity effects of urban housing to households in different land transfer conditions, we conducted group regression based on the state of household land circulation in column (4) and (5). We can find from (4) that among the households whose land has completely transferred, families with urban housing have a lower willingness to withdraw from the land. The results of the regression (5) are confusing, indicating that among households whose land has not been transferred, households with urban housing are more willing to withdraw from the land. It's difficult to give a reasonable explanation, as if household has no land transferred, indicates that the household has no intention to flow into the city to work and settle. Therefore, urban housing is more likely to be prepared for the marriage of children.

From the analysis above, we find that both urban housing and land transfer influence households' future intentions to withdraw, with wealthier households that own urban housing showing less willingness to relinquish land ownership. The less a household's income depends on the land, the more likely it is to withdraw from it. The issue of decentralized land property rights in China has long been difficult to resolve.

Land has long played a crucial role in ensuring the survival security of farmers. If the governing authorities wish to facilitate the gradual withdrawal of farmers from their lands and achieve proper land consolidation, it is essential to protect the interests of rural migrants. China's collective ownership system for rural land ensures farmers' basic living rights but limits their private property rights. Farmers must make a cautious decision when giving up land rights, as the value of land is directly influenced by the uncertainties of central government policy. The empirical research results indicate that, firstly, wealthier households are less willing to relinquish land contracting rights compared to poorer households, who are more inclined to do so. Secondly, due to differences in risk-bearing capacity and economic compensation, wealthier households are more reluctant to surrender their land for compensation. Ultimately, labor mobility conditions significantly influence the decisions of wealthier individuals regarding their land rights.

5.5. Robustness check

In this part, compensation demand is substitute for explained variable to test the robustness of the main results. Compensation demand as a direct benefit of withdrawing land may give us another analytical perspective of this question. To further illustrate the role of wealth effect of urban housing in land withdrawal, we study the relationship between compensation demand and annual household income, reflecting the family's ability to earn money. The statistic results are shown in Table 7.

From the statistics in Table 7, we can find that nearly half of the samples need the government to provide older security and job opportunity. Lack of security may be an important reason why farmers are reluctant to give up land property rights. On the other hand, we find that the higher the household's income level is, the higher they demand land withdraws compensation are. Next part we give regression test using land compensation as explained variable, the results are in Table 8. Column (1) is based on the full sample and column (2) is based on the sample who explicitly state their attitude. The results of the estimate show that ownership of urban housing will decrease their willingness to withdraw land. The independent variable of column (3) is housing area, assigning to 1 if housing area is >100 m^2s, otherwise is 0. The results show that housing area will affect farmers' compensation requirements for exiting land rights at a 1 % significance level.

Generally speaking, farmers who do not transfer agricultural land have strong dependence on agricultural land. Since agriculture is an important support for their life, theoretically, withdraw land will bring greater uncertainty to their income and life. Column (4) in Table 8 is based on full sample, and column (5) is based on households who want to withdraw the land right. The more land the farmers have transferred, the weaker their dependence on the land. The report shows that the weaker the farmers are, the lower the requirements for compensation. Column (6) is based on the samples who have withdrawal willingness, and test the compensation requirement difference between high land transfer household and low land transfer household. In the regression, we assigned land transfer to 1 if the sample did not transfer and land and the rest is 0. The coefficient of land transfer in column (6) is positive and significant at 1 % level. In other words, the rural households whose farmland has not been transferred are more inclined to obtain the guaranteed compensation for withdrawing the rural land right.

Table 7
Statistics on compensation option of different income level households.

Compensatory Type	Specific Implementation Details	Grouped by annual income (%)		
		<50 Thousand yuan	≥50 Thousand Yuan	Total Percentage
A	Monetary compensation (price per acre plus land area plus remaining period)	23.82	11.29	15.47
B	Increase certain compensation based on type A	31.41	19.82	23.69
C	Certain compensation (less than type A), and Family pension insurance	9.420	9.970	9.790
D	Certain compensation (less than type A), provide employment for the whole family	2.880	1.180	1.750
E	Certain compensation (less than type A), Family pension insurance, provide employment for the whole family	32.46	57.74	49.30

Table 8
The return results of urban housing and land transfer to land compensation requirements.

VARIABLES	Land compensation					
	Urban Housing Effect			Land Transfer Effect		
	(1)	(2)	(3)	(4)	(5)	(6)
Urban housing	0.128***	0.104*				
	(0.030)	(0.059)				
Housing area			0.174***			
			(0.058)			
Land transfer				−0.136***	−0.183***	0.341***
				(0.022)	(0.042)	(0.076)
Head's gender	−0.013	0.073	−0.064	−0.008	0.092	0.072
	(0.029)	(0.060)	(0.053)	(0.032)	(0.061)	(0.061)
Head's age	0.115***	0.278***	0.120***	0.177***	0.273***	0.270***
	(0.018)	(0.040)	(0.036)	(0.022)	(0.042)	(0.041)
Education	0.056***	0.161***	0.080**	0.120***	0.178***	0.169***
	(0.018)	(0.036)	(0.035)	(0.021)	(0.038)	(0.038)
Family size	−0.056***	−0.049*	−0.020	−0.033**	−0.055**	−0.051*
	(0.013)	(0.029)	(0.022)	(0.014)	(0.028)	(0.028)
Income level	0.106***	0.173***	0.042	0.095***	0.198***	0.193***
	(0.022)	(0.043)	(0.044)	(0.022)	(0.039)	(0.039)
Land area	−0.004	−0.019	0.029*	0.003	−0.008	−0.012
	(0.004)	(0.018)	(0.016)	(0.004)	(0.017)	(0.019)
Land certificate	0.017	0.234**	−0.059	0.025	0.230**	0.232**
	(0.057)	(0.101)	(0.079)	(0.058)	(0.108)	(0.106)
Certificate Num	0.064***	0.012	0.001	0.041***	0.016	0.015
	(0.013)	(0.028)	(0.024)	(0.014)	(0.028)	(0.028)
Observations	1317	415	420	1175	414	414
Pseudo R-squared	0.0752	0.158	0.0627	0.0836	0.188	0.182

Note: The average marginal effects are reported in the table. All numbers in parentheses are robust standard errors. ***, ** and * represent statistical significance at 1 %, 5 %and 10 %, respectively.

6. Conclusion and recommendations

Facilitating the gradual withdrawal of qualified farmers from land is a significant challenge in China's urbanization process. Similar to other developing countries, China's rural areas suffer from an excessive agricultural population and fragmented land holdings, hindering large-scale agricultural production and reducing productivity. With the rise in non-agricultural employment opportunities, Chinese farmers' reliance on land is decreasing. Although agricultural income is becoming less significant, the collective land system still limits the scalability of agriculture. Considering the current compensation policy for land withdrawal, this study investigates the behavioral effects of labor mobility barriers on wealth disparity. The systematic analysis leads to the following conclusions:

(1) Despite substantial rural labor migration in China, there remains a low overall willingness to withdraw from land, with only 31.01 % of surveyed households in developed regions willing to relinquish their collective land rights.
(2) Owning urban housing reduces a household's willingness to withdraw from land contract rights by 6.4 %, whereas engaging in land transfers increases this willingness by 3.8 %. Households with urban housing are less inclined to relinquish land property rights, and the larger the area of this housing (as a percentage of total wealth), the less willing they are to withdraw from rural land. Farmers who transfer more land are more willing to give it up, owing to their reduced dependence on land-derived income. Interaction effect analysis revealed that land transfer has a more significant impact on households without urban housing.
(3) Further study on the compensation requirements for withdrawing from rural collective land corroborates earlier research findings. Households that own urban housing demand higher compensation, and the weaker their dependence on rural land, the lower their compensation requirements.

Based on the study's findings, policymakers are urged to refine land exit compensation mechanisms to mitigate the risks associated with a "one-size-fits-all" approach. This is essential, as uniform land exit requirements and compensation rates could result in significant land resource losses for the truly impoverished. More detailed suggestions for policy development are as follows:

(1) Regarding the duration and extent of withdrawal, the government can guide farmers to select specific modes of withdrawal in accordance with legal provisions.Combining the connotation of voluntary and compensated withdrawal of land contract management right, legal provisions and local practices, the voluntary and compensated withdrawal of land contract management right can be categorized into two situations, i.e., voluntary and compensated withdrawal of land contract management right during the contract period and permanent withdrawal of land contract management right.

(2) In terms of specific promotion, it is necessary to respect farmers' willingness to withdraw in accordance with the principle of marketization, and also to play the role of the government in promoting the reform in a prudent manner. The market should play a decisive role in land resource allocation, and farmers' wishes should be fully respected to address their demands and the broader needs of urban and rural development through the reform of voluntary and compensated land contract withdrawals.
(3) In terms of compensation for land withdrawal, compensation for voluntary and compensated land contract withdrawals can be bifurcated based on the nature of the land tenure. One part of the compensation is the property compensation for the production value of the contracted land, which shall be the main compensation, and the compensation party shall be the collective economic organization that recovers the land contracted management right. The other part of the compensation is the compensation for the security attributes of the contracted land management right, which is selective and supplementary and can be borne by the government. The governments of regions with the conditions can, according to the level of local development, give certain compensation in accordance with the members involved in withdrawing the right to contract management of land.
(4) In terms of land utilization, improve the market-oriented utilization mechanism of withdrawn land to ensure that agricultural land is used for agricultural purposes. Optimizing land allocation is a key objective in the reform of voluntary and compensated land contract withdrawals. Conditional business entities, especially new agricultural business entities and young farmers, should be encouraged to participate in the transfer and utilization of withdrawn land based on the market mechanism, so as to improve the efficiency of land utilization.

Further, regarding the promotion of agricultural land withdrawal reform, attention should also be paid to the following two aspects: (1) Pay attention to the linkage of reforms and localization. In reforming voluntary and compensated land contract withdrawals, the government should neither control everything nor completely disengage. For farmers who have moved to cities and settled down in the cities and have no dependence on land, we can encourage regions with the conditions to carry out the coordinated voluntary and compensated withdrawal of the "three rights", so as to reduce the overall cost of the reform and to respond to the demands of the farmers. In addition, as different regions of China have different conditions and levels of development, it is not appropriate to adopt a "one-size-fits-all" approach to reform, but rather to allow each region to combine its own realities with a certain amount of room for innovation, while complying with the requirements of the law and theories, and adhering to the principles and the bottom line. (2) Pay attention to the fairness and external impact of the reform. First, to prevent the voluntary and compensated withdrawal of land contract management rights from becoming a privilege for conditional farmers. It is crucial to avoid overly generous compensation for farmers who can afford to withdraw and setting stringent application conditions, thus preventing compensated withdrawal from becoming a privilege limited to select farmers. The market mechanism should be brought into play to form reasonable compensation standards and achieve a balanced separation, so that farmers with conditions have the will to withdraw, while farmers without conditions are unwilling to withdraw. Secondly, to prevent the voluntary and compensated withdrawal of land contract management right from interfering with the market of agricultural land transfer. Efforts must be made to ensure that reforms in voluntary and compensated land withdrawal do not inflate land transfer market prices and consequently increase agricultural operation costs. On the one hand, on the basis of market-based withdrawal, it is necessary to distinguish between property compensation based on the production value of contracted land and security compensation based on membership in the withdrawal of land contracted management rights, so as to avoid misjudgment of the value of the land by farmers under mixed compensation; on the other hand, it is necessary to set a limit on the maximum compensation for voluntary compensation for the withdrawal of land contracted management rights, so as to prevent the tendency of capitalization of agricultural land.

CRediT authorship contribution statement

Zhang Guangcai: Conceptualization, Formal analysis, Methodology, Writing – original draft, Data curation, Investigation, Writing – review & editing. **Zhang Shihu:** Conceptualization, Data curation, Formal analysis, Methodology, Writing – review & editing, Writing – original draft. **Zhu Tingyu:** Data curation, Investigation. **Gu Haiying:** Conceptualization, Funding acquisition, Supervision, Investigation.

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