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The Effect of Procedural Justice and Psychological Preference on Farmers' Satisfaction with Land Acquisition

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Abstract: The land acquisition system plays a crucial role in the transformation of urban and rural land and the protection of farmers' interests. Research indicates that justice in acquisition procedures significantly impacts farmers' satisfaction, though more empirical support is needed. This paper constructs a land acquisition bargaining game model incorporating procedural justice and a "farmers' land acquisition willingness-psychological preference" model based on farmers' aversion to inequality. Using data from "Thousand Students, Hundred Villages" Survey in 2021, a hierarchical Logit model is constructed to empirically test the effects of procedural justice and farmers' psychological preferences on their satisfaction with land acquisition, considering the moderating effect of farmers' cognitive awareness levels and the heterogeneous impact of the nature of acquisition. The study shows that: (1) In terms of procedural justice, when other variables remain constant, compared to local governments that do not provide advance notice or announcements, those that do increase farmers' satisfaction with land acquisition by 116.8%; consulting with villagers increases satisfaction by 110.3%; publicly disclosing compensation fees increases satisfaction by 108.2%. Regarding farmers' psychological preferences, compared to farmers who receive lower compensation than other villages, those who receive equal or higher compensation have a 136.5% higher satisfaction with land acquisition. (2) Compared to farmers who are unaware of land acquisition policies, those who are aware and participate in consultations are, on average, 176.1% more likely to be satisfied with the acquisition compared to those who do not participate. (3) In public welfare land acquisitions, farmers are less concerned with procedural justice and psychological preferences compared to non-public welfare acquisitions. The study suggests continuously improving the transparency of land acquisition information, paying attention to the psychological biases of farmers as bounded rational economic agents, further enhancing farmers' understanding of land policies, and clearly distinguishing different scenarios of land acquisition purposes.

Keywords: Land acquisition satisfaction; procedural justice; psychological preferences; land acquisition system; "Thousand Students, Hundred Villages"

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1. Introduction

As one of the core components of China's dual urban–rural land system, the land acquisition system plays a crucial role in linking rural and urban areas and providing the legal basis for converting agricultural land into construction land or other forms of state-owned land. Issues and conflicts related to land acquisition not only affect the integrity and stability of urban–rural relations but also represent significant factors influencing China's social and economic development. Accordingly, the Central Committee of the Communist Party of China and the State Council have attached great importance to rural land system reform. The level of standardization and legalization of land acquisition directly concerns the fundamental interests of the general population, especially farmers, and constitutes an important aspect of the government's efforts to modernize the national governance system.

The satisfaction of farmers affected by land acquisition is influenced by multiple factors. Existing research on land acquisition satisfaction has largely focused on compensation standards, causes of land-related conflicts, and potential solutions (Jin and Li, 2022; Li and Peng, 2019; Wang and Chen, 2015). Early studies primarily concentrated on compensation levels, leading to a widely held consensus that “insufficient compensation is the main driver of farmers' dissatisfaction and land-related conflicts” (Hui and Bao, 2013; Li, 2018; Wang and Chen, 2015). Negotiations over land acquisition compensation have been shown to improve compensation levels to some extent (Li and Peng, 2019). Following the 18th National Congress of the Communist Party, compensation ratios for affected farmers have increased (Chai and Dong, 2014), and governments in some economically developed regions have adjusted compensation rates or provided additional welfare benefits to farmers affected by land acquisition (Yang et al., 2017). However, whether higher compensation standards substantially improve farmers' satisfaction remains debated. While most scholars agree that increased compensation is positively correlated with higher satisfaction (Cao and Zhang, 2018; Sun et al., 2018; Wen et al., 2020), others argue that, despite recent policy adjustments incorporating more farmer-friendly components such as guaranteed housing, higher compensation has not significantly enhanced satisfaction (Tang et al., 2016). Scholars have also highlighted that compensation distribution patterns, the nature of the land acquisition, and the location of the land can affect satisfaction, making fair distribution a critical challenge (Shuai, 2011; Xie, 2016).

Beyond compensation standards, increasing attention has been paid to the transparency and justice

of government procedures, the protection of farmers' property rights, and individual farmers' psychological preferences (Cao and Zhang, 2018; Li and Cai, 2012; Liu, 2012; Qian and Tang, 2007; Rao et al., 2020). Compared with the compensation level alone, farmers place greater emphasis on procedural justice, equality in status, and the comprehensiveness of post-acquisition resettlement schemes when evaluating household welfare and satisfaction (Zeng and He, 2023). Domestic debates on land acquisition procedures have not yet reached a consensus. Theoretical discussions have largely focused on how to standardize land acquisition procedures (Jin et al., 2010; Tan, 2008) and grant farmers rights to information, participation, and land use (Liu et al., 2016; Wang, 2013). Evidence suggests that procedural justice often outweighs monetary compensation in determining satisfaction: whether farmers are informed and involved in the process has a more significant impact on satisfaction than compensation itself (Feng et al., 2021; Li and Xu, 2004; Liu et al., 2012). The 2021 "Thousand Students, Hundred Villages" Survey indicated that only 14% of land acquisitions notified farmers beforehand, although this proportion has gradually increased over time—from 11.5% in 2006–2010 to about 12.5% in 2011–2015, stabilizing in 2016. Based on these findings, some scholars argue that the Land Administration Law should be further improved to make acquisition procedures more fair, transparent, and just, such as by adopting negotiated purchase as a preliminary procedure (Liang and Liu, 2008; Liu and Yu, 2022).

Individual psychological biases are also important factors influencing satisfaction. According to Prospect Theory, decision-makers typically establish a reference point—a baseline value—to evaluate whether potential outcomes constitute gains or losses and to assess their satisfaction accordingly. In land acquisition, farmers, as landowners, evaluate their satisfaction relative to such reference points. Some scholars argue that changes in farmers' willingness before and after land acquisition, as well as dissatisfaction with the current system, partly stem from discrepancies between psychological expectations and actual outcomes (Li and Cai, 2012; Qian and Tang, 2007). Psychological expectations regarding compensation are influenced by various factors. Drawing on Social Comparison Theory (Wills, 1981; Zhang et al., 2023), individuals in certain social strata form subjective perceptions and evaluations of inequality and their own socioeconomic status (Liu, 2001). Social comparison widely shapes cognitive and emotional responses (Lange and Crusius, 2015). Consequently, farmers may use the compensation received by other farmers as a reference point to judge their own satisfaction.

In summary, most existing research focuses on farmers' responses to government actions and the

direction of policy reform in the context of frequent land-related conflicts. **Some studies consider farmers' psychological gaps and bounded rationality in land transfer and acquisition decisions, yet few integrate the local government-farmer interactions with individual psychological biases into a coherent analytical framework. Moreover, limited research has examined the moderating effects of other factors on these relationships.** This study utilizes the “Thousand Students, Hundred Villages” database and employs Logit models, hierarchical Logit models, and propensity score matching to empirically examine the effects of procedural justice and farmers' psychological preferences on satisfaction. At the theoretical level, we develop a bargaining model incorporating procedural justice and a “farmer land acquisition willingness-psychological preference” model based on inequality aversion, exploring the intrinsic mechanisms through which procedural justice and psychological preferences influence satisfaction, while considering the moderating role of farmers' cognitive awareness.

2. Theoretical Mechanism and Research Hypotheses

Based on the preceding literature review, the theoretical framework of this study is illustrated in Figure 1. Procedural justice and farmers' psychological preferences influence satisfaction with land acquisition through two main pathways, denoted as Path a and Path b, which correspond to Hypotheses 1 and 2, respectively.

Specifically, procedural justice affects farmers' relative gains from land acquisition compensation by influencing their discount factor (Path a in Figure 1). Meanwhile, the income of other farmers serves as a reference point shaping individual farmers' psychological preferences, which, together with their relative gains, jointly determines their satisfaction with land acquisition (Path b in Figure 1). Furthermore, the level of farmers' cognitive awareness moderates the effect of procedural justice on land acquisition satisfaction. In addition, the purpose of land acquisition may introduce heterogeneity into both Path a and Path b. The detailed derivation of the theoretical models is presented in Sections 2.1 – 2.3.

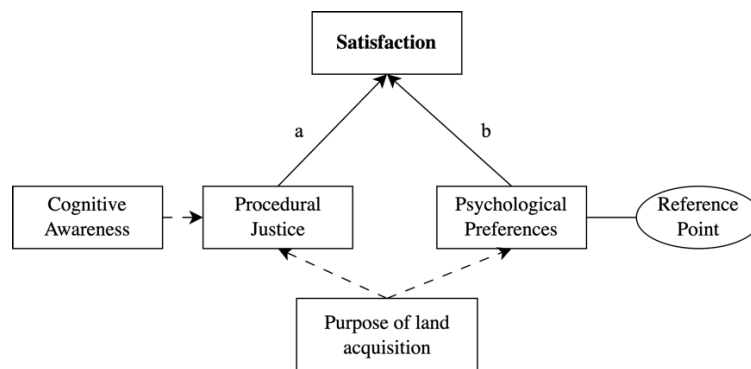


Figure 1. The mechanism through which procedural justice and farmers' preferences influence satisfaction with land acquisition

2.1 The Impact of Procedural Justice on Farmers' Satisfaction with Land Acquisition

Following the approach of Jin et al. (2010), this section constructs a bargaining model of land acquisition negotiation based on the Rubinstein model (Rubinstein, 1982) under the existing land acquisition system in China. The model analyzes the strategic interactions between the government and farmers in the distribution of land value increment.

To simplify the analysis, the following assumptions are made: there exists a delay cost in negotiation; the government and farmers' discount factors¹ are denoted as δ_1 and δ_2 respectively

¹ The discount factor represents the loss incurred by the government or farmers due to time delays during the negotiation process. In other words, obtaining 1 yuan in the next period is equivalent to receiving δ yuan in the current period. The magnitude of this loss is determined by the level of patience of the government or the farmers. The more eager a party is to reach an agreement, the higher its time cost in the negotiation, and consequently, the smaller its discount factor.

($\delta_1 \leq 1, \delta_2 \leq 1$); and both parties are aware of each other's discount factors. The bargaining sequence is as follows: the government first proposes a distribution scheme, after which the two parties alternate in making offers¹.

Shaked and Sutton (1984) demonstrated that this game has a unique subgame perfect Nash equilibrium. In equilibrium, the government proposes the division scheme $\left(\frac{1-\delta_2}{1-\delta_1\delta_2}, 1 - \frac{1-\delta_2}{1-\delta_1\delta_2}\right)$ in the first period, which the farmer accepts, as delaying the negotiation would result in lower payoffs for both parties.

Procedural justice in the government's land acquisition process can be reflected in whether farmers are informed in advance, consulted about compensation and resettlement plans, and informed of the distribution of compensation funds. Among these, the right to information serves as the prerequisite for other rights. Theoretically, when farmers can participate deeply in the process through consultation, they can express their preferences, and the government, in turn, can design more reasonable and equitable compensation plans. Such participation enhances farmers' sense of involvement, recognition, and perceived fairness. Hence, the more fully farmers participate in the land acquisition process and understand its procedures and compensation mechanisms, the higher their "patience" level becomes, and thus, the greater their discount factor (δ_2).

Taking the derivative of $\frac{1-\delta_2}{1-\delta_1\delta_2}$ with respect to δ_2 yields:

$$\frac{\partial \left(\frac{1-\delta_2}{1-\delta_1\delta_2} \right)}{\partial \delta_2} = \frac{-(1-\delta_1\delta_2) + \delta_1(1-\delta_2)}{(1-\delta_1\delta_2)^2} = \frac{\delta_1-1}{(1-\delta_1\delta_2)^2} < 0$$

Thus, based on the Nash equilibrium of the land acquisition bargaining game, given a constant government discount factor, an increase in farmers' patience (i.e., a higher δ_2) reduces the government's payoff and increases the farmers' compensation income. This, in turn, enhances their perception of fairness and improves satisfaction with land acquisition.

Therefore, we propose:

H1: Procedural justice has a significant effect on farmers' satisfaction with land acquisition.

¹ According to Article 27 of the *Regulations for the Implementation of the Land Administration Law of the People's Republic of China* (revised in 2021), the government, as the first mover in the bargaining process, acts on a legal basis.

2.2 The Impact of Farmers' Psychological Preferences on Satisfaction

According to Prospect Theory (PT), Kahneman and Tversky (1979) argue that individuals evaluate outcomes relative to a reference point, leading to different attitudes toward the same result. Farmers' inequality aversion makes the income of other farmers a natural reference point for evaluating their own satisfaction with land acquisition. Therefore, this study models farmers' satisfaction at the individual level using a utility function that incorporates both self-interest and inequality aversion (Fehr and Schmidt, 1999).

Here, self-interest reflects the assumption of rational economic behavior, which is, farmers seek to maximize their compensation income. Inequality aversion implies that farmers compare their compensation with that of others in the same village and prefer more equitable outcomes. The utility function representing fairness (inequality aversion) between farmer i and farmer j can be expressed as:

$$U_i = \pi_i - \delta_i \max(\pi_j - \pi_i, 0) - \alpha_i \max(\pi_i - \pi_j, 0)$$

where π_i and π_j denote monetary payoffs (i.e., compensation incomes), $\delta_i \geq \alpha_i$, and $\alpha_i \in [0, 1]$. The function reflects both the valuation of one's own payoff and aversion to payoff differences. The weight of disadvantageous inequality ($\pi_j - \pi_i > 0$) represented by δ_i is greater than that of advantageous inequality (α_i).

Extending this utility function to a group context, we obtain:

$$U_i = \pi_i - \delta_i \max(\sum_{j=1}^k \pi_j / k - \pi_i, 0) - \alpha_i \max(\pi_i - \sum_{j=1}^k \pi_j / k, 0) \quad j = (1, 2, \dots, k)$$

where k represents the number of farmers (excluding i) in the same or nearby villages who were also affected by land acquisition in the same year. This formulation implies that farmer i compares his own compensation with the average compensation of others rather than a single peer.

To simplify, we assume $\alpha = \varepsilon$, where ε is a small constant that can be ignored—meaning farmers' aversion to advantageous inequality is minimal compared with disadvantageous inequality. The social preference function can thus be simplified as:

$$U_i = \pi_i - \delta_i \max(\sum_{j=1}^k \pi_j / k - \pi_i, 0) \quad j = (1, 2, \dots, k)$$

It follows that farmers' utility depends not only on their own compensation but also on the relative comparison with the average compensation of others. Therefore, we propose:

H2: Farmers' psychological preferences significantly influence satisfaction with land acquisition, and their effect exceeds that of procedural justice.

2.3 Heterogeneity Analysis

This section focuses on two sources of heterogeneity: (1) the moderating effect of farmers' cognitive awareness on the relationship between procedural justice and satisfaction, and (2) the heterogeneous effects of different types of land acquisition.

Farmers' understanding of land acquisition policies may moderate the impact of procedural justice. Those who are informed about relevant policies are more likely to focus on whether the acquisition process is fair, rather than only on compensation standards. Among the different dimensions of procedural justice, prior notification or public announcement, consultation on compensation and resettlement plans, and disclosure of compensation revenue information, farmers' cognitive awareness is expected to have a moderating effect only on consultation. This is because consultation is the only dimension in which farmers participate actively, whereas in the other two types, their involvement is passive, limiting the moderating role of their policy understanding.

The effects of procedural justice and psychological preferences also vary across different types of land acquisition. In public-interest acquisitions, both the government and affected farmers can benefit, and the farmers' reciprocal preferences may reduce their demand for procedural justice. By contrast, non-public-interest acquisitions often provide little tangible benefit to farmers, leading them to rely more heavily on negotiation and other mechanisms to secure fairer outcomes. Thus, non-public-interest land acquisitions require greater attention to procedural justice and farmers' psychological preferences.

Accordingly, we propose two heterogeneity hypotheses:

H3a: Farmers' cognitive awareness moderates the relationship between procedural justice (specifically, consultation on compensation and resettlement plans) and their satisfaction.

Compared with uninformed farmers, procedural justice has a stronger positive effect on satisfaction among farmers who understand land acquisition policies.

H3b: Compared with non-public-interest acquisitions, procedural justice and farmers' psychological preferences have weaker effects on satisfaction in public-interest land acquisitions.

3. Sample, Variable Selection, and Model Specification

3.1 Survey Method and Sample Data

This study employs land acquisition data from the “Thousand Students, Hundred Villages” Survey conducted by Renmin University of China in 2021 for econometric analysis. Between July and August 2021, teams of faculty and students from the university carried out extensive fieldwork across 118 counties and cities in 31 provinces, autonomous regions, and municipalities in mainland China (excluding Hong Kong, Macao, and Taiwan). They conducted structured questionnaires and in-depth interviews with over 9,000 rural households. In total, 109 valid village-level questionnaires and 3,808 valid household questionnaires were collected¹. The geographical distribution of the sample is shown in Figure 2.

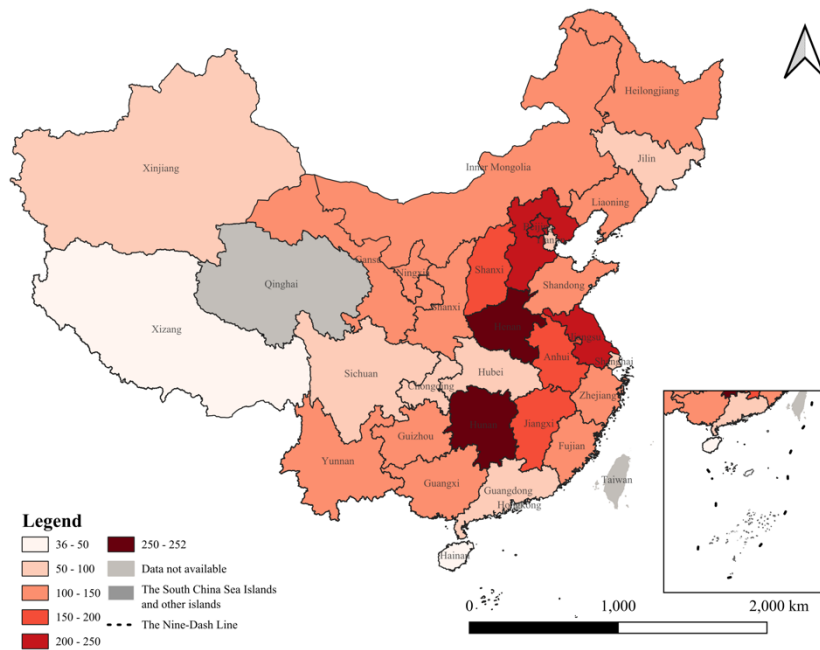


Figure 2. Geographic Distribution of Samples from the 2021 “Thousand Students, Hundred Villages” Survey

¹ The household survey consists of two levels: a village-level questionnaire and a household-level questionnaire.

The village-level respondents were village cadres, while the household-level respondents were household heads or their spouses. The sampling followed a three-stage stratified design, with sampling conducted at the county, village, and household levels.

3.2 Variable Selection

The dependent variable in this study is farmers' satisfaction with land acquisition, measured by the question "Were you satisfied with the most recent land acquisition?" from the "Thousand Students, Hundred Villages" Survey. Responses were rated on a five-point scale from 1 ("very dissatisfied") to 5 ("very satisfied"). Based on this, a binary variable was constructed: responses of "satisfied" and "very satisfied" were coded as 1, and "neutral," "somewhat dissatisfied," and "very dissatisfied" were coded as 0. For robustness checks, the original five-category variable was also used. The core explanatory variables include measures of procedural justice and farmers' psychological preferences. Following Feng et al. (2021), procedural justice is assessed from three aspects: whether the farmer was notified in advance, whether compensation and resettlement plans were consulted, and whether compensation standards were publicly disclosed. An interaction term between consultation and the farmer's level of **policy awareness** is also included to capture potential moderating effects. The psychological preference variable focuses on whether the farmer's compensation was higher than that in other villages. In addition, the analysis controls for household characteristics, village characteristics, geographical conditions, and regional economic and industrial structures. Variable names and definitions are presented in Table 1.

Table 1. Variable Definitions and Descriptive Statistics

Category	Variable Name	Definition	Observations	Mean	Std. Dev.
Dependent variable	Satisfaction with land acquisition	Satisfied = 1; Not satisfied = 0	429	0.61	0.49
Procedural justice variables	Prior notification or public announcement	Notified in advance = 1; Not notified = 0	429	0.86	0.35
	Consultation on compensation and resettlement plans	Consulted = 1; Not consulted = 0	406	0.69	0.46
	Disclosure of compensation revenue information	Disclosed = 1; Not disclosed = 0	368	0.75	0.43
Psychological preference variable	Comparison with other villages	Not lower than others = 1; Lower = 0	324	0.64	0.48
Household variables	Age	Continuous variable	429	55.53	14.01
	Gender	Male = 1; Female = 0	429	0.71	0.45
	Household living standard in the village	Good = 1; Average or poor = 0	429	2.79	0.97
	Policy awareness	Aware of land acquisition policy = 1; Unaware = 0	429	0.29	0.45
	Education	Literate = 1; Illiterate = 0	429	0.91	0.29
	Actual compensation amount (yuan/mu)	Continuous variable	363	32,954.93	91,588.33
	Non-monetary compensation	Yes = 1; No = 0	429	0.17	0.38
	Year of the most recent land acquisition	Continuous variable	414	2013.11	7.31

Category	Variable Name	Definition	Observations	Mean	Std. Dev.
Village-level variables	Type of village economy	Agriculture-based = 1; Non-agriculture-based = 0	429	0.40	0.49
	Township center area	Located in township center = 1; Otherwise = 0	429	0.93	0.29
	Village	Village = 1; Non-village = 0	429	0.74	0.44
	Hill	Hill = 1; Otherwise = 0	429	0.36	0.48
	Plain	Plain = 1; Otherwise = 0	429	0.37	0.48
	Plateau	Plateau = 1; Otherwise = 0	429	0.00	0.07
Regional variables	Eastern region	Province located in eastern China = 1; Otherwise = 0	429	0.63	0.48
	Central region	Province located in central China = 1; Otherwise = 0	429	0.00	0.00
	Northeastern region	Province located in northeastern China = 1; Otherwise = 0	429	0.09	0.28

Note: Since the 2021 “Thousand Students, Hundred Villages” Survey did not include land acquisition samples from the central provinces, the value of the “Central region” variable is 0 for all observations.

3.3 Econometric Method and Model Specification

3.3.1 Null Model

First, a two-level null model is constructed, including both the village level and the household level, to examine whether variables at different levels have a significant impact on the dependent variable (farmers’ satisfaction with land acquisition). This allows us to test whether cross-level variation contributes to the differences in satisfaction among farmers¹. The model is specified as follows:

Level-1:

$$\begin{aligned}
 Prob(y_{ij} = 1) &= \varphi_{ij} \\
 \ln\left(\frac{\varphi_{ij}}{1 - \varphi_{ij}}\right) &= \rho_{ij} \\
 \rho_{ij} &= \beta_{0j} + \varepsilon_{ij}
 \end{aligned}$$

Level-2:

$$\beta_{0j} = \gamma_{00} + \mu_{0j}$$

Full Model Equation:

$$\rho_{ij} = \gamma_{00} + \varepsilon_{ij} + \mu_{0j}$$

Where Level-1 represents the household level and Level-2 represents the village (administrative) level. y_{ij} denotes the land acquisition satisfaction of household i in village j , where 1 indicates that the household is satisfied with the most recent land acquisition, and 0 indicates dissatisfaction. φ_{ij} represents the probability that satisfaction equals 1. ρ_{ij} is the log-odds of being “satisfied” versus “not satisfied,” that is, the value of the Logit link function. β_{0j} denotes the average level of land

¹ Since the dependent variable is a binary choice variable (0-1), we use the Logit Model as the link function.

acquisition satisfaction among households in village j ; γ_{00} is the overall intercept (the grand mean of ρ_{ij}); and ε_{ij} and μ_{0j} are the random effects at the household and village levels, respectively.

3.3.2 Random Intercept Model

The main objective of this study is to distinguish the effects of village-level and household-level characteristics. Therefore, a random intercept model¹ is employed to examine the effects of procedural justice and farmers' psychological preferences on land acquisition satisfaction. The model is specified as follows:

Level-1:

$$\begin{aligned} \text{Prob}(y_{ij} = 1) &= \varphi_{ij} \\ \ln\left(\frac{\varphi_{ij}}{1 - \varphi_{ij}}\right) &= \rho_{ij} \\ \rho_{ij} &= \beta_{0j} + H_pre_{ij}\beta_{1j} + H_just_{ij}\beta_{2j} + X_{ij}\alpha_{1j} + \varepsilon_{ij} \\ \rho_{ij} &= \beta_{0j} + H_pre_{ij}\beta_{1j} + H_just_{ij}\beta_{2j} + \beta_{3j}H_just_j \times Knowledge_{ij} + X_{ij}\alpha_{1j} + \varepsilon_{ij} \end{aligned}$$

Level-2:

$$\begin{aligned} \beta_{0j} &= \gamma_{00} + V_j\gamma_{01} + V_pre_j\gamma_{02} + V_just_j\gamma_{03} + \mu_{0j} \\ \beta_{1j} &= \gamma_{10} \\ \beta_{2j} &= \gamma_{20} \\ \beta_{3j} &= \gamma_{30} \\ \alpha_{1j} &= \gamma_{40} \end{aligned}$$

Full Model Equation:

$$\begin{aligned} \rho_{ij} &= \gamma_{00} + V_j\gamma_{01} + V_pre_j\gamma_{02} + V_just_j\gamma_{03} + H_pre_{ij}\gamma_{10} + H_just_{ij}\gamma_{20} + X_{ij}\gamma_{40} + \varepsilon_{ij} + \mu_{0j} \\ \rho_{ij} &= \gamma_{00} + V_j\gamma_{01} + V_pre_j\gamma_{02} + V_just_j\gamma_{03} + H_pre_{ij}\gamma_{10} + H_just_{ij}\gamma_{20} \\ &\quad + H_just_j \times Knowledge_{ij}\gamma_{30} + X_{ij}\gamma_{40} + \varepsilon_{ij} + \mu_{0j} \end{aligned}$$

Here, H_pre_{ij} represents the household-level psychological variable, namely the perceived relative compensation level compared with other villages; H_just_j denotes the village-level procedural justice variables, including whether advance notice was given, whether compensation and resettlement were negotiated, and whether compensation standards were disclosed. X_{ij} represents other household-level control variables. V_pre_j and V_just_j are village-level independent variables, while V_j captures village characteristics. The interaction term $H_just_j \times Knowledge_{ij}$ measures the moderating effect of farmers' policy awareness on the relationship between procedural justice and satisfaction. β and γ represent the coefficients of Level-1 and Level-2 variables, respectively, and μ denotes the random error term.

¹ The Random Intercept Model assumes that the effects of variables at the two levels are independent. In other words, while the overall mean of the dependent variable varies across groups (villages), the regression slopes are assumed to be fixed across all groups.

3.3.3 Propensity Score Matching (PSM) Model

Although local governments generally implement land acquisition policies in strict accordance with central standards, farmers' psychological preferences may differ due to individual or village characteristics, potentially leading to sample selection bias (Li et al., 2017; Liu and Zhao, 2015). To address this issue, this study employs the Propensity Score Matching (PSM) method to estimate the correlation between land acquisition satisfaction, procedural justice, and farmers' psychological preferences (Heckman et al., 1997), thereby testing the robustness of the model's conclusions.

4. Empirical Results and Analysis

4.1 Baseline Model Results

In this section, we first report the results of the null model. After confirming that variations in farmers' satisfaction with land acquisition are jointly determined by both household-level and village-level factors, we present the results of the random intercept and random slope models. Subsequently, we incorporate farmers' policy awareness as a moderating variable into the random intercept and random slope models. Finally, we conduct a heterogeneity analysis by dividing the sample into public-interest land acquisition and non-public-interest land acquisition groups.

4.1.1 Null Model Results

The intraclass correlation coefficient (ICC) of the null model is 0.222 (greater than 0.2)¹, indicating that 22.2% of the total variation in farmers' satisfaction with land acquisition originates from differences between villages. Furthermore, the estimated between-group variance (τ_{00}) is positive and statistically significant, suggesting the existence of substantial inter-village variation. Therefore, we conclude that the dependent variable is correlated with group-level differences, and incorporating village-level characteristics into a hierarchical model can improve the accuracy of parameter estimation.

Table 2. Null Module Results

	Parameter	Coefficient	Standard Error
Fixed Effects	Intercept (γ_{00})	0.645***	0.177
Random Effects	Between-group variance (τ_{00})	0.940***	0.378
	Intraclass Correlation Coefficient (ICC)	0.222	0.070
	Household Sample Size		429
	Village Sample Size		71
	Log likelihood		-271.227
	LR test		30.14***

Notes: 1. In the hierarchical Logit model, the Level-1 error term is assumed to follow a logistic distribution, so its variance is constrained to $\sigma^2 = \frac{\pi^2}{3} = 3.29$ (applies throughout). 2. The ICC is calculated as: $ICC = \tau_{00}/(\tau_{00} + \sigma^2)$. 3. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

4.1.2 Random Intercept Model Estimation Results

Based on the null model results and considering the characteristics of the dependent variable, we employed random intercept and random slope models to analyze the specific factors affecting

¹ If the intraclass correlation coefficient (ICC) is less than 0.2, it indicates that the reliability of the group-level effect is relatively low.

farmers' satisfaction with land acquisition, in order to obtain more precise estimates. The baseline econometric results are presented in Table 3, which includes six models. Models (1) – (3) use a standard Logit regression as a comparison, while models (4) – (6) employ hierarchical Logit regression. Models (1) and (4) include only variables measuring procedural justice (whether notified, whether consulted, whether compensation standards were disclosed), farmers' psychological preferences (relative compensation compared with other villages), as well as compensation level, compensation type, and year of land acquisition. Models (2) and (5) additionally include household-level control variables, such as household head age, gender, education, and household living standard. Models (3) and (6) further incorporate village-level characteristics, including village geographic location, topography, economic type, and population. From Table 3, it is evident that whether the village compensation level is higher than in other villages, whether the government provided prior notice or public announcement, whether the government consulted with villagers regarding compensation and resettlement, and whether the government disclosed the compensation revenue all have significant positive effects on farmers' satisfaction with land acquisition.

We focus primarily on Model (6), which controls for both household and village characteristics, to examine the full hierarchical Logit regression results of procedural justice and farmers' psychological preferences. Using Stata to calculate average marginal effects¹, we find that, holding other variables constant: 1. Compared with villages where the government did not provide prior notice or announcement, when the government provides prior notice or a public announcement, farmers' satisfaction increases by 116.8%. 2. Compared with villages where the government did not consult with villagers, consultation increases satisfaction by 110.3%, indicating that deep consultation has a greater impact than passive announcements. 3. Compared with villages where compensation revenue was not disclosed, disclosure increases satisfaction by 108.2%, a statistically significant improvement. 4. Farmers' psychological preferences also significantly affect satisfaction, households whose compensation is equal to or higher than other villages report a 136.5% higher satisfaction compared with those whose compensation is lower.

Regarding control variables, receiving non-monetary compensation also affects satisfaction. In addition, village topography influences farmers' satisfaction, compared with mountainous and hilly areas, households in plain areas report higher satisfaction. The average marginal effect shows that, holding other variables constant, satisfaction in plains is 119.8% higher than in mountainous regions.

¹ The Stata command for calculating average marginal effects is: `margins, dydx(*)`.

Table 3. Baseline Estimation and Test Results of Land Acquisition Satisfaction Models

		(1)	(2)	(3)	(4)	(5)	(6)	
		Logit Model			Hierarchical Logit Model			
Psychological preference variable	Comparison	1.464***	1.435***	1.365***	1.464***	1.435***	1.365***	
		(0.338)	(0.349)	(0.383)	(0.335)	(0.345)	(0.367)	
Procedural justice variables	Notification	1.011*	0.985*	1.168**	1.011**	0.985*	1.168**	
		(0.536)	(0.566)	(0.586)	(0.505)	(0.511)	(0.531)	
	Consultation	0.968**	0.979**	1.103***	0.968***	0.979***	1.103***	
		(0.387)	(0.390)	(0.428)	(0.369)	(0.374)	(0.402)	
	Disclosure	1.236***	1.253***	1.082**	1.236***	1.253***	1.082**	
		(0.433)	(0.440)	(0.445)	(0.430)	(0.434)	(0.443)	
Household variables	Actual compensation amount (yuan/mu)	-0.106	-0.108	-0.025	-0.106	-0.108	-0.025	
		(0.118)	(0.125)	(0.127)	(0.111)	(0.114)	(0.123)	
	Non-monetary compensation	0.807*	0.846**	0.589	0.807*	0.846*	0.589	
		(0.424)	(0.429)	(0.451)	(0.486)	(0.494)	(0.518)	
	Year	-0.008	-0.007	-0.001	-0.008	-0.007	-0.001	
		(0.028)	(0.029)	(0.031)	(0.027)	(0.027)	(0.028)	
	East	-0.404	-0.386	-0.147	-0.404	-0.386	-0.147	
		(0.630)	(0.635)	(0.740)	(0.644)	(0.656)	(0.746)	
	West	-0.565	-0.512	-0.006	-0.565	-0.512	-0.006	
		(0.649)	(0.662)	(0.751)	(0.676)	(0.689)	(0.806)	
	Age		0.000	-0.006		0.000	-0.006	
				(0.013)	(0.014)		(0.013)	(0.014)
	Gender			0.290	0.278		0.290	0.278
				(0.349)	(0.393)		(0.360)	(0.380)
Education			0.315	0.301		0.315	0.301	
			(0.409)	(0.442)		(0.406)	(0.421)	
Living standard			-0.031	-0.071		-0.031	-0.071	
			(0.170)	(0.177)		(0.168)	(0.174)	
Village variables	Village			0.202			0.202	
				(0.539)			(0.564)	
	Township center area			-0.339			-0.339	
				(0.747)			(0.847)	
	Plain			1.198**			1.198**	
				(0.497)			(0.483)	
	Hill			0.403			0.403	
				(0.472)			(0.469)	
Plateau			0.000			0.000		
			(.)			(.)		

Type of village economy			0.127		0.127	
			(0.420)		(0.449)	
Village population			-0.000		-0.000	
			(0.000)		(0.000)	
Intercept	14.208	12.196	0.174	14.208	12.196	0.173
	(56.913)	(57.963)	(61.573)	(53.458)	(53.753)	(56.269)
Sample size	249	248	248	249	248	248
Sample size R ²	0.247	0.250	0.277	-	-	-
Chi-square	56.935	56.761	65.048	55.268	54.860	57.881
AIC	263.581	269.861	273.141	265.581	271.861	275.141

Note: Standard errors are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. The sample size refers to the number of households, unless otherwise stated (applies throughout).

4.1.3 Household Knowledge as a Moderating Variable

Table 4 reports the regression results after including household knowledge as a moderating variable. In this study, only the interaction between household knowledge and whether consultation occurred is constructed, because prior notice and disclosure of compensation standards are already relatively well-established procedural elements, while the latest land acquisition policies primarily emphasize consultation. Consistent with the baseline regressions, Models (1) – (3) use standard Logit regression, and Models (4) – (6) employ the more precise hierarchical Logit regression. The models sequentially include independent variables, household characteristics, and village characteristics. From the hierarchical Logit results, household knowledge has a positive moderating effect on consultation. This suggests that the more knowledgeable a household is about the land acquisition system and policies, the more attention it pays to procedural justice, thereby enhancing the effect of procedural justice on satisfaction. Specifically, the average marginal effect is 1.761, indicating that, compared with farmers who are unaware of the land acquisition policy, knowledgeable farmers who participate in consultation have a 176.1% higher probability of being satisfied with land acquisition than those who do not participate.

Table 4. Estimation and Test Results of Land Acquisition Satisfaction Models with Moderating Variable

		(1)	(2)	(3)	(4)	(5)	(6)
		Logit Model			Hierarchical Logit Model		
Psychological preference variable	Comparison	1.477***	1.416***	1.270***	1.408***	1.359***	1.216***
		(0.311)	(0.354)	(0.385)	(0.321)	(0.339)	(0.363)

Procedural justice variables	Notification	0.842*	0.994*	1.217**	0.805*	0.970*	1.216**
		(0.473)	(0.531)	(0.564)	(0.469)	(0.501)	(0.531)
	Consultation	0.892**	0.703*	0.784*	0.893**	0.675*	0.775*
		(0.381)	(0.413)	(0.453)	(0.374)	(0.406)	(0.430)
	Disclosure	0.835**	1.085**	1.012**	0.781**	1.007**	0.952**
		(0.386)	(0.449)	(0.458)	(0.378)	(0.422)	(0.436)
Moderating Variable	Knowledge × Consultation	1.143	1.398	1.576	1.385*	1.624*	1.761**
		(0.839)	(0.973)	(1.011)	(0.775)	(0.846)	(0.878)
	Knowledge	0.249	0.025	-0.045	0.046	-0.194	-0.234
		(0.675)	(0.822)	(0.876)	(0.605)	(0.677)	(0.709)
Household variables		Yes	Yes	Yes	Yes	Yes	Yes
Village variables		Yes	Yes	Yes	Yes	Yes	Yes
Intercept		2.357	-1.515	-14.594	-2.389***	-1.913	-2.210
		(46.778)	(59.109)	(61.548)	(0.517)	(1.427)	(1.705)
Sample size		283	248	248	286.000	251.000	251.000
Sample size R ²		0.259	0.277	0.307	-	-	-
Chi-square		66.904	61.944	64.131	62.433	56.295	59.544
AIC		288.295	261.396	263.658	294.452	267.684	268.978

4.1.4 Subsample Regression Analysis

Table 5 reports the subsample regression results of the baseline model. Models (1) and (4) present the full-sample results, Models (2) and (5) report the results for public-interest land acquisitions only, and Models (3) and (6) focus on the subsample of cases where prior notification was provided. Based on the average marginal effects, the results from Models (4) and (5) show that the coefficients for higher compensation compared with other villages, prior notification, and consultation are smaller in the latter model than in the former. This suggests that farmers' attitudes and expectations differ significantly depending on the nature of the land acquisition project.

For public-interest land acquisitions, farmers tend to be more accepting, perceiving that both the government and villagers benefit from such projects. This reflects reciprocal preferences, which weaken both inequality aversion and the demand for strong procedural justice. In contrast, in non-public-interest acquisitions, farmers often receive little direct benefit and are therefore more motivated to negotiate for better compensation and rights. They also tend to compare their compensation levels with those of other villages. Consequently, for non-public-interest acquisitions, ensuring procedural justice and maintaining consistent compensation standards are especially important.

Comparing Models (4) and (6), the regression results show that when the sample is limited to cases with prior notification, the coefficient for higher compensation relative to other villages is larger than in the full-sample model. This indicates that farmers' psychological preferences exert a stronger influence on satisfaction when the government has provided advance notice.

Table 5. Results of Subsample Regression Analysis

		(1)	(2)	(3)	(4)	(5)	(6)
		Logit Model			Hierarchical Logit Model		
Psychological preference variable	Comparison	1.365*** (0.383)	1.123** (0.470)	1.427*** (0.418)	1.365*** (0.367)	1.123** (0.471)	1.427*** (0.399)
Procedural justice variables	Notification	1.168** (0.586)	1.304* (0.748)	0.000 (.)	1.168** (0.531)	1.304 (0.802)	0.000 (.)
	Consultation	1.103*** (0.428)	0.900* (0.531)	1.141** (0.479)	1.103*** (0.402)	0.900* (0.514)	1.141** (0.449)
	Disclosure	1.082** (0.445)	1.623*** (0.599)	1.194** (0.502)	1.082** (0.443)	1.623*** (0.630)	1.194** (0.497)
Household variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Village variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Intercept	0.174 (61.573)	10.634 (88.458)	-32.411 (62.758)	0.173 (56.269)	10.634 (76.497)	-32.410 (61.760)
	Sample size	248	165	216	248	165	216
	Sample size R ²	0.277	0.274	0.261	-	-	-
	Chi-square	65.048	45.871	50.226	57.881	34.965	46.537
	AIC	273.141	192.557	234.417	275.141	194.557	236.417

4.2 Endogeneity Test

Although local governments across different regions generally implement land acquisition policies in strict accordance with national standards, farmers' psychological preferences may vary due to their individual characteristics or village-level features, potentially leading to sample selection bias. To address this issue, this study employs propensity score matching (PSM) using appropriate household and village characteristic variables. The results show that the average treatment effect on the treated (ATT) is significant (T-value = 7.35), indicating that there is a systematic difference between the treatment and control groups—that is, farmers' psychological preferences have a significant positive effect on land acquisition satisfaction.

The regression results after matching are presented in Table 6, which shows that the PSM estimates remain consistent with the proposed hypotheses. A balance test was also conducted for the PSM estimation, and the results indicate that the standardized bias (% bias) of most variables is less than 10%, and the t-tests are not statistically significant¹, suggesting that the sample balance is satisfactory.

Table 6. Results after propensity score matching

		(1)	(2)	(3)	(4)	(5)	(6)
		Logit Model			Hierarchical Logit Model		
Psychological							
preference	Comparison	1.418***	1.423***	1.362***	1.418***	1.423***	1.362***
variable		(0.341)	(0.350)	(0.386)	(0.339)	(0.347)	(0.370)
Procedural							
justice	Notification	0.789	0.693	0.845	0.789	0.693	0.845
variables		(0.556)	(0.577)	(0.561)	(0.549)	(0.559)	(0.581)
	Consultation	1.109***	1.152***	1.327***	1.109***	1.152***	1.327***
		(0.416)	(0.426)	(0.470)	(0.390)	(0.398)	(0.434)
	Disclosure	1.132**	1.135**	0.930**	1.132**	1.135**	0.930**
		(0.462)	(0.467)	(0.474)	(0.451)	(0.457)	(0.470)
Household variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Village variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intercept		-2.791	-10.741	-39.407	-2.790	-10.741	-39.407
		(57.221)	(56.736)	(58.291)	(55.036)	(55.624)	(57.838)
Sample size		230	230	230	230	230	230
Sample size R ²		0.232	0.238	0.269	-	-	-
Chi-square		51.546	51.999	60.017	49.285	49.665	53.415
AIC		249.147	255.290	258.111	251.147	257.290	260.111

4.3 Robustness Tests

4.3.1 Ordered Logit Model

The ordered Logit model is applied to test the robustness of the estimation results. As shown in Table 7, the results are consistent with the baseline findings: under other conditions being equal, both farmers' psychological preferences and procedural justice have a positive impact on land acquisition satisfaction. The ordered Logit model takes into account the ordinal nature of

¹ The insignificance of the t-test results indicates that, for most variables, the null hypothesis of no systematic difference between the treatment and control groups cannot be rejected.

categorical variables more rigorously, and therefore the estimated coefficients may differ due to the influence of this ordered relationship.

Table 7. Results of ordered Logit model

		(1)	(2)	(3)
Psychological preference variable	Comparison	1.067*** (0.298)	1.017*** (0.302)	0.903*** (0.342)
Procedural justice variables	Notification	0.821* (0.495)	0.859* (0.520)	0.919* (0.544)
	Consultation	1.054*** (0.319)	1.121*** (0.327)	1.106*** (0.336)
	Disclosure	1.245*** (0.387)	1.173*** (0.387)	1.098*** (0.398)
Household variables	Yes	Yes	Yes	
Village variables	Yes	Yes	Yes	
	cut1	2.519 (35.941)	1.186 (36.528)	7.832 (40.838)
	cut2	4.461 (35.936)	3.172 (36.525)	9.846 (40.832)
	cut3	5.914 (35.924)	4.616 (36.511)	11.337 (40.822)
	cut4	8.256 (35.917)	7.009 (36.493)	13.784 (40.804)
	Sample size	249	248	248
	Sample size R ²	0.123	0.132	0.144
	Chi-square	96.517	98.482	111.836
	AIC	676.596	676.101	679.357

4.3.2 Multi-database Validation

This section employs data on land acquisition from the 2019 “Thousand Students, Hundred Villages” Survey to test the robustness of the land acquisition satisfaction model. Due to data limitations, several variables were replaced. Specifically, since the 2019 survey did not include the question “Compared with other villages, is the compensation level in your village higher, lower, or about the same?”, we used farmers’ responses to “Compared with your expectations, is the compensation level higher, lower, or about the same?” as a proxy variable. The rationale is that farmers’ expectations regarding compensation are typically formed based on the compensation levels observed among neighboring or nearby villages.

The baseline regression results and the results including the interaction term are presented in Tables 8 and 9. The findings show that farmers' psychological preferences have a significant positive impact on land acquisition satisfaction. For the procedural justice variables, the coefficients of "prior notification" and "negotiation" are largely consistent with those in the baseline model. However, the coefficient of "public disclosure" differs significantly from the baseline, possibly because of the high proportion of missing responses to the "public disclosure" question in the 2019 dataset, which may prevent the regression from reflecting the true situation. In the models including the moderating variable, the interaction term between farmers' cognitive level and negotiation is significantly positive, consistent with the results of the baseline model reported in Table 3.

Table 8. Baseline Estimation Results Using the 2019 "Thousand Students, Hundred Villages" Survey Data

		(1)	(2)	(3)	(4)	(5)	(6)
		Logit Model			Hierarchical Logit Model		
Psychological preference variable	Comparison	2.954*** (0.429)	2.952*** (0.439)	2.995*** (0.446)	3.010*** (0.451)	3.002*** (0.452)	2.995*** (0.447)
Procedural justice variables	Notification	1.739*** (0.602)	1.649*** (0.606)	1.794*** (0.660)	1.750*** (0.605)	1.674*** (0.616)	1.794*** (0.641)
	Consultation	1.327*** (0.372)	1.412*** (0.376)	1.485*** (0.419)	1.341*** (0.387)	1.418*** (0.399)	1.485*** (0.410)
	Disclosure	-0.601 (0.417)	-0.559 (0.415)	-0.927** (0.458)	-0.627 (0.395)	-0.590 (0.398)	-0.927** (0.422)
Household variables		Yes	Yes	Yes	Yes	Yes	Yes
Village variables		Yes	Yes	Yes	Yes	Yes	Yes
	Intercept	-36.548 (48.163)	-42.999 (48.287)	-91.895 (56.328)	-40.495 (46.932)	-46.347 (47.026)	-91.895* (53.213)
	Sample size	278	277	276	278	277	276
	Sample size R ²	0.322	0.325	0.349			
	Chi-square	80.180	79.144	90.387	59.220	59.452	65.556
	AIC	277.855	283.904	285.887	279.510	285.573	287.887

Table 9. Regression Results of the Model with the Moderating Variable Using the 2019 “Thousand Students, Hundred Villages” Survey Data

		(1)	(2)	(3)	(4)	(5)	(6)
		Logit Model			Hierarchical Logit Model		
Psychological preference variable	Comparison	3.113*** (0.431)	3.111*** (0.435)	3.217*** (0.461)	3.269*** (0.514)	3.263*** (0.514)	3.217*** (0.472)
Procedural justice variables	Notification	1.702*** (0.621)	1.570** (0.626)	1.702** (0.683)	1.733*** (0.625)	1.618** (0.638)	1.702*** (0.658)
	Consultation	0.606 (0.444)	0.710 (0.454)	0.687 (0.499)	0.564 (0.486)	0.656 (0.501)	0.687 (0.500)
	Disclosure	-0.562 (0.427)	-0.507 (0.426)	-0.860* (0.467)	-0.625 (0.420)	-0.579 (0.425)	-0.860** (0.430)
Moderating Variable	Knowledge × Consultation	1.946** (0.842)	1.957** (0.852)	2.158** (0.897)	2.131** (0.828)	2.164*** (0.838)	2.158*** (0.795)
	Knowledge	-0.790 (0.701)	-0.701 (0.719)	-0.922 (0.739)	-0.892 (0.675)	-0.806 (0.682)	-0.922 (0.667)
Household variables		Yes	Yes	Yes	Yes	Yes	Yes
Village variables		Yes	Yes	Yes	Yes	Yes	Yes
Intercept		-50.284 (47.774)	-57.938 (47.286)	- 105.107* (55.208)	-54.248 (48.195)	-61.431 (48.340)	- 105.107* (53.277)
Sample size		278	277	276	278	277	276
Sample size R ²							
Chi-square		80.622	79.486	93.356	55.727	56.149	68.317
AIC		271.919	277.124	279.301	273.132	278.252	281.301

5. Conclusions and Policy Recommendations

This study examines the effects of procedural justice and farmers' psychological preferences on land expropriation satisfaction. We construct a bargaining game model of land expropriation negotiations incorporating procedural justice and a "farmer expropriation willingness–psychological preference" model based on farmers' aversion to inequality, and empirically test their impact on farmers' satisfaction with land expropriation. This section summarizes the main findings and proposes relevant policy recommendations.

5.1 Research Findings

Using the 2021 and 2019 "Thousand Students, Hundred Villages" survey databases, we conducted baseline regression analyses and robustness checks, and employed propensity score matching (PSM) to test for endogeneity and verify our hypotheses. The main findings are as follows:

1. Procedural justice affects farmers' satisfaction with land expropriation by influencing their "patience" in bargaining with the government over compensation distribution. Due to limited rationality and inequality aversion, farmers simultaneously consider their own compensation and compare it with that of other farmers, which in turn affects their satisfaction.
2. Holding other factors constant, when the government consults with farmers on compensation and resettlement plans, higher levels of farmers' awareness of land policies significantly enhance their satisfaction with expropriation. This suggests that improving farmers' understanding of land policies strengthens the effect of procedural justice—especially government consultation—on farmers' patience and thereby on their satisfaction.
3. The impact of procedural justice and farmers' psychological preferences on satisfaction varies by expropriation purpose. For example, the coefficients of compensation higher than other villages, prior notice, and consultation in models restricted to public-interest land expropriation are smaller than those in full-sample models, indicating heterogeneous effects.

5.2 Policy Recommendations

Based on the findings, farmers' subjective satisfaction with land expropriation depends more on procedural justice and psychological preferences than on monetary compensation. Policies that focus solely on increasing economic compensation without ensuring procedural justice may not effectively improve satisfaction. Therefore, we propose the following recommendations:

1. **Enhance transparency in land expropriation practices.** Detailed information about proposed construction projects (e.g., plot location and size, number of affected households, and project leaders) and the negotiation and contracting process should be made publicly accessible to ensure

transparency and justice. These measures can help build a fair and rational land expropriation system and promote social stability and equity.

2. Address farmers' psychological preferences. Recognizing farmers' social comparison tendencies and cognitive biases as boundedly rational economic agents is critical. To safeguard farmers' right to information and promote transparent practices, information should not be limited to the local village but extended to neighboring villages and even the entire county. The government should also consider compensation standards in other villages and strictly adhere to the Land Administration Law, establishing uniform compensation standards to avoid inequities such as "identical land, different compensation." These measures can enhance justice and rationality in expropriation processes and further stabilize rural society.

3. Improve farmers' awareness of land policies. Our findings indicate that farmers' policy knowledge moderates the effect of procedural justice on satisfaction. Therefore, local governments should strengthen outreach through multiple channels, such as meetings, public lectures, and door-to-door visits. Enhancing farmers' understanding of land policies increases their comprehension and acceptance, improves their participation in decision-making, promotes transparency and democratic processes, and ensures protection of their rights.

4. Differentiate expropriation by purpose. Compensation strategies should distinguish between public-interest expropriation (e.g., schools, hospitals, subways) and non-public-interest expropriation (e.g., urban expansion, commercial housing, office buildings) and adopt differentiated approaches accordingly.

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