International Journal for Housing Science and Its Applications
Publish August 10, 2025. Volume 46, Issue 4 Pages 2302-2313

https://doi.org/10.70517/ijhsa464196

Practical Forms, Value Implications, and Quantification of Homestead Site Qualification Rights

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Abstract Based on the background of the reform of “three rights of residence”, this paper systematically researches the practice pattern, value connotation and quantitative assessment of the qualification right of residence. Based on the content system of the qualification right of residential base, which includes 8 rights, a risk assessment index system for the transfer of rural residential base is constructed. Combined with the survey data of 500 farmers, the Borda ordinal value method and fuzzy comprehensive evaluation model are used to quantitatively assess the risk of transfer. Based on the regression analysis model, the influence of risk perception and risk avoidance on the transfer behavior of the right to use the homestead base of farmers is examined. The Borda ordinal value of medical insurance popularity (D2) is 1, which is the most critical among all risk factors. The individual risk score of farm households is 57.37, which is in the medium warning level but close to the heavy warning threshold. Perceived economic risk, perceived social risk and perceived psychological risk of the transfer of homestead use right have a significant negative effect on the transfer of homestead use right of farmers, which are significant at the 1%, 5% and 5% levels, respectively. Risk aversion has a significant negative effect on farmers' homestead transfer behavior, which is significant at the 1% level.

Index Terms homestead eligibility rights, risk assessment, Borda ordinal value method, fuzzy comprehensive evaluation, regression analysis

I. Introduction

The reform of the homestead land system is a key component of rural land system reform, and clarifying the nature and functions of qualification rights is the crux of this reform [1]. As the legal vehicle for the reform requirement of “ensuring the qualification rights of homestead land households,” homestead land qualification rights serve as the legal vehicle for identity-based rights within homestead land usage rights under the “two-rights separation” framework. They are also the key mechanism for achieving farmers' “right to adequate housing” under the “three-rights separation” framework [2]-[5]. Rural households, as the main body of guaranteeing the right to homestead qualification, set up the homestead qualification right to achieve the basic guarantee function of housing [6], [7].

Under the “two-rights separation” framework, the basic guarantee of “housing for every household” for collective members is primarily borne by the collective through the provision of homestead land as a welfare benefit [8], [9]. Farmers apply for collective land allocation for housing construction on a household basis based on their collective membership status [10]. Therefore, membership in the rural collective economic organization has become the primary basis for determining eligibility to apply for collective land allocation [11], [12]. It is evident that identity has become the most prominent fundamental attribute of homestead land use rights under the “two-rights separation” framework [13]. This identity restriction is also regarded as a key mechanism to ensure the effective implementation of the homestead land system's social security function. However, it also significantly hinders the marketization of homestead land use rights and constrains the release of homestead land asset value [14]-[17].

The direction of rural homestead land system reform has become increasingly clear, moving toward clarifying qualification rights, gradually separating the social security function and property function of rural homestead land, and consolidating the “three-rights separation” framework [18]-[20]. This provides an important pathway to address the confusion between the social security function and property function caused by the high degree of integration between identity-based rights and property-based rights in rural homestead land use rights under the “two-rights separation” system [21], [22]. However, in practice, residential land management still faces contradictions such as conflicts between housing security and property rights, excessive expansion, and large-scale idleness. This necessitates the use of a combination of qualitative and quantitative research methods to systematically analyze

the issues existing in the evolution of the residential land system, and to explore the logic and implementation pathways of the “three-rights separation” of residential land based on problem-oriented approaches.

Clarifying the reform requirements for homestead qualification rights is a necessary step in scientifically constructing the homestead qualification rights system. Many scholars have studied how to establish fair rules for determining homestead qualification rights. Literature [23] explores the legal pathways for rural land management system reform, providing legal theoretical support for the reform of the “three rights” separation system for homesteads, with the aim of accelerating the process of market-based land transfers while safeguarding farmers' land property rights. Literature [24] utilized the Coupling Coordination Degree Model (CCDM) and Propensity Score Matching-Difference-in-Differences (PSM-DID) to analyze the relationship between homestead system reform and farmers' sense of gain, providing valuable references for the reform of the “three rights” separation system for homesteads. Literature [25] focuses on the distribution of appreciation benefits during the transfer of residential land qualification rights, pointing out that issues such as restricted transfer targets, unclear rights holders, and ambiguous distribution principles have to some extent led to the idleness of rural residential land and above-ground housing, and proposes relevant suggestions in this regard. Literature [26] clarifies the connotation of qualification rights in the “three rights separation” system for homestead land. As a new type of right separated from the original homestead land use rights, it possesses identity attributes and residential security, playing a significant role in promoting the circulation of homestead land and the replacement of idle resources. Literature [27] explores the reform path of the homestead system from the perspective of judicial governance, pointing out that the value of qualification rights runs through the entire process of land circulation. By coordinating the appreciation benefits of homesteads and establishing a multi-center collaborative governance mechanism, it promotes the fair distribution of land appreciation benefits. It is foreseeable that future reforms of the homestead land system will focus on formally establishing the entities responsible for recognizing qualification rights and clarifying the legal status of homestead land qualification rights. Therefore, researching the essence and quantification methods of homestead land qualification rights holds significant importance.

This paper firstly deconstructs the composite power of the qualification right of homestead base, and analyzes eight powers, such as the right of possession and use, and the right of income. Based on the survey data of 500 farmers, the current situation of the transfer of residential land in the sample area is analyzed. An indicator system with four dimensions is constructed, and the sample data are empirically evaluated based on fuzzy comprehensive evaluation. The Borda ordinal value method is introduced to identify key risk factors. With the help of Pearson correlation analysis, the linear relationship between farmers' perception of the risk of homestead transfer and the factors is measured. The regression model is used to test the influence of risk perception and risk avoidance on farmers' homestead use right transfer behavior.

II. Definition and survey of the transfer of rural residential land

II. A. Content of the right to qualify for a homestead

The content of the right to qualify for a homestead, as well as the subject and object of the right to qualify for a homestead, are the constituent elements of the right to qualify for a homestead. As a comprehensive right, the qualification right of residential land has the attribute of membership right of personal nature, and it also contains property attribute. The qualification right under the pattern of “three rights of homestead” not only emphasizes the property nature of the possession, use, income, disposal and other powers, but also focuses on the protection of the personal nature of the right content. The content of the qualification right of residential land includes the following aspects:

(1) The right of possession and use

The qualification right of residential base has the property right attribute, and it has the right of possession and use. The possession right of the qualification right of the residential base is manifested in the qualification right of tenure and the right of recovery after the transfer of the right to use the expiration of the right. The qualification right use function refers to the use of the qualification right of the residence base. Farmers enjoy the right to exercise the qualification right to build houses and ancillary facilities on their own residential land, which is the realization of the inherent requirements of the right to housing of the basic survival and development of human beings.

(2) Right to income

The right to income has relevance to the possession and use of the residence base, which includes both the transaction consideration obtained by the qualification right holder through the transfer of all or part of the transfer of the right of use, and the right of the qualification right holder to obtain the compensation for the withdrawal of the residence base. The qualification right holder has the right to obtain the agreed consideration for the residence base from the user right holder, which guarantees the basic residence rights and interests of the qualification right holder.

The right to income mainly consists of three parts: the right to transfer income, the right to withdraw with compensation and the right to obtain compensation for expropriation.

(3) Disposal right

After obtaining the right to use the residential base, the person who has the right to use the residential base can hold the right to use or transfer it outward, and can even grant or transfer the right to the immediate family members or members of the collective economic organization within the collective. This right of disposition needs to be distinguished from the right to use the homestead, the content of the right to use the homestead contains the de jure and de facto disposition, and the right of disposition in this paper focuses more on the exit of the homestead. The right to withdraw from the qualification refers to the right to voluntarily give up the right to apply for the qualification of homestead or return the homestead that has been applied for to the village collective, so that the right will be extinguished.

(4) Right of Access

The right to acquire qualification refers to the right of farmers who are members of rural collective economic organizations to apply for a certain area of homestead to build houses and exercise the right to use the homestead if they meet the conditions. The object of the exercise of this right is the collective economic organization, and the acquisition of the right of eligibility is mainly based on the need for the right of survival of the peasants under the conditions of meeting the conditions for the separation of households and the natural loss of homesteads.

(5) Right to Restrictions

Although the right to qualify for a homestead has a gratuitous element, it does not mean that the right to qualify for a homestead is a right that is not subject to any restriction. According to current laws and regulations, the first restriction on the right to a homestead is “one house, one residence” and the stipulation of the area of the homestead, and if the area exceeds the stipulation of the area or otherwise does not conform to the stipulation of the use of the homestead, a fee shall be paid for the use of the homestead.

(6) License right

This right is mainly for the registration and confirmation of the right, the qualification right of homestead should be registered and confirmed, which is conducive to the better protection of the rights and interests of the qualification right of homestead. Farmers need to carry out the transfer of the right to use the residential land, you need to obtain the permission of the owner and the qualification right holder, and then go to the registration authority for the change or transfer of residential land registration. The qualification right of residence base is to identity qualification as the condition of obtaining, as far as the legal level, the qualification right of residence base registration is only the form of farmers to obtain residence base, there is no confirmatory effect.

(7) Management right

The management right here mainly refers to the right of the qualification right of the residence base based on the contractual responsibility of the right to use the residence base must have the right to correct. If the qualification right person has not carried out the transfer of the right of use, that is, when the identity of the subject of the right is overlapped, the management of the right of use of the qualification right of the residential base is mainly manifested in the qualification right person's self-management; If the qualification right person carries on the transfer of the right of use of the residential base, the qualification right of the residential base should be managed by the use of the right to use the right to use the right to exercise the right of use of the residential base.

(8) Right to relief

The right to qualification relief refers to the right of the qualification right holder of the homestead base to obtain relief when his or her legitimate rights and interests are infringed upon. In reality, special attention should be paid to the legitimate rights and interests of the qualification right holder in the collective economic organization, the village committee or the person in charge of the infringement, the qualification right holder enjoys the right to sue, the right to relief especially need to introduce is the direct infringement of the qualification right of the homestead revocation system and indirect infringement of qualification right of the derivation of the litigation system.

II. B.Analysis of the current situation of the transfer of homesteads in the sample area

II. B. 1) Descriptive statistics of survey results

In order to comprehensively understand the status of farmers' awareness of the risk of transferring homesteads, the data in this paper comes from a questionnaire survey conducted by the group in August-September 2024 in the rural areas of typical counties and cities in a province. Stratified random sampling was adopted, and firstly, X city, Y city and Z city, the pilot cities of homestead reform, were selected as the sample cities from the perspectives of first pilot of the policy, superior geographic location and developed agricultural economy. The objects of the survey mainly include land and resource bureaus, township governments, village collectives and farm households in the sample areas, and this paper adopts the talk-type survey for land and resource bureaus and township governments,

and one-on-one questionnaire interviews for village collectives and farm households. Two to five villages were randomly selected from the sample area, and farmers were randomly selected from each village to conduct the household questionnaire survey.

The statistical results of the questionnaire survey on rural residence base transfer in the sample area are shown in Table 1. 130 questionnaires from farm households and 4 questionnaires from village collectives in the sample village of X city were surveyed, totaling 134 questionnaires, accounting for 26.8% of the total number of questionnaires. 193 questionnaires from farm households and 9 questionnaires from village collectives in Y city were surveyed, totaling 202 questionnaires, accounting for 40.4% of the total number of questionnaires. 152 questionnaires from farm households and 12 questionnaires from village collectives in Z city were surveyed, totaling 164 questionnaires which accounted for 32.8% of the total number of questionnaires. In order to ensure the authenticity and reliability of the questionnaires, family members over 18 years of age were selected to conduct the questionnaire survey, and for ethnic minority households that could not communicate in Mandarin, the questionnaires were translated by village cadres or ethnic minority university student volunteers, with a total of 475 households and 25 village cadres conducting the questionnaire survey.

Table 1: Statistics of Questionnaires on the Transfer of Rural Homesteads

Region	Survey sample points	Farmer		Village collective		Total number of samples	
		N	Proportion/%	N	Proportion/%	N	Proportion/%
X	X1	62	13.05	2	8	64	12.8
	X2	68	14.32	2	8	70	14
	Subtotal	130	27.37	4	16	134	26.8
Y	Y1	30	6.32	2	8	32	6.4
	Y2	55	11.58	1	4	56	11.2
	Y3	61	12.84	3	12	64	12.8
	Y4	47	9.89	3	12	50	10
	Subtotal	193	40.63	9	36	202	40.4
Z	Z1	18	3.79	2	8	20	4
	Z2	41	8.63	3	12	44	8.8
	Z3	33	6.95	3	12	36	7.2
	Z4	24	5.05	1	4	25	5
	Z5	36	7.58	3	12	39	7.8
	Subtotal	152	32	12	48	164	32.8
Total		475	100.00	25	100.00	500	100.00

The questionnaire takes the farm household as the survey object, and the basic information of the research object includes the basic information of the surveyed farm household and the basic information of the farm household family. Through the analysis of the basic information of the surveyed farmers and their families, in order to initially understand the farmers' understanding of the transfer of homesteads, as a basis for analyzing the influence of the farmers' willingness to transfer homesteads, the basic information of the surveyed farmers is statistically analyzed.

II. B. 2) Analysis of respondents' sources of income

The sample area involves a total of 11 natural villages, and the basic situation of each village and the surveyed farm households are shown in Table 2. In terms of economic level, there is an obvious gradient difference in per capita income among the villages, with Z4 ranking first with a per capita income of 17,500 yuan, and Y1 with a per capita income of only 0.81 million yuan.All the sample villages in X and Y have completed the confirmation of the right to homesteads, while the confirmation of the right to homesteads is in progress in the five sample villages of Z. This difference in the progress of the system's implementation may have a substantial impact on the subsequent transfer of homesteads.

Table 2: Basic information of each village and survey of farmers

Region	Survey sample points	Total number of households	Total population	Per capita income/ten thousand yuan	Average homestead area per household/hm2	Confirmation of homestead rights
X	X1	705	3285	1.64	0.073	Completed
	X2	1264	5868	1.42	0.041	Completed
Y	Y1	136	475	0.81	0.123	Completed

	Y2	1174	3058	1.45	0.145	Completed
	Y3	668	1999	1.06	0.082	Completed
	Y4	246	685	1.72	0.133	Completed
Z	Z1	153	526	1.73	0.091	Ongoing
	Z2	463	1255	0.92	0.088	Ongoing
	Z3	305	918	1.66	0.096	Ongoing
	Z4	136	405	1.75	0.078	Ongoing
	Z5	255	758	1.37	0.083	Ongoing

III. Risk evaluation of rural residential land transfer and analysis of risk influencing factors

III. A. Construction of risk evaluation index system

A scientific and reasonable assessment index system can accurately predict the risk status and provide a reliable basis for taking effective countermeasures to reduce the losses caused by the risk. This paper combines the connotation of the risk of the transfer of the right to use rural residential land, follows the principles of scientific, systematic and operable, and selects the risk assessment index system of the transfer of rural residential land from the perspective of the economic, social, environmental and security factors of the farmers, and the specific indicators are shown in Table 3. Economic indicators (weight 0.6038) as the core risk dimension, its sub-indicators in the proportion of agricultural income (A1) of the risk distribution shows obvious right skewed, 60-80 subparagraphs of the highest proportion of heavy police, reflecting the transfer risk that may be brought about by the generally high degree of dependence of farm households on agricultural income. Among the social indicators (weight 0.1784), the risk distribution of non-agricultural livelihood skills (B2) is relatively balanced, but the huge alarm in the 80-100 segment still accounts for 10.18%, highlighting the vulnerability of some farm households in terms of occupational transition. The environmental indicator (weight 0.0882) shows that the ability to accept a new way of life (C1) has the highest concentration in the 40-60 segment, while the risk distribution curve of kinship and neighborhood (C3) is relatively flat, indicating that the risk of adaptation to the social environment is universal but moderate. Among the security indicators (weight 0.1296), pension insurance prevalence (D1) accounts for the lowest percentage of macropolicies in the 80-100 subsection, but medical insurance prevalence (D2) accounts for 10.33% in this subsection, indicating that there is still an obvious shortcoming in the rural medical security system.

Table 3: Risk Assessment Index System and Its Fuzzy Membership Degree

Target layer	Indicator layer	0~20	20~40	40~60	60~80	80~100
		No police	Light police	Central police	Heavy police	Giant police
Economic indicator (A,0.6038)	Proportion of agricultural income(A1,0.3185)	0.0000	0.1568	0.3973	0.4115	0.0344
	Income growth rate(A2,0.1847)	0.1184	0.3872	0.2946	0.1904	0.0094
	The situation of living burden(A3,0.4968)	0.1387	0.2185	0.3392	0.2011	0.1025
Social indicator (B,0.1784)	The number of residences owned(B1,0.1564)	0.0947	0.2048	0.3184	0.2277	0.1544
	Livelihood skills in non-agricultural industries(B2,0.5665)	0.1574	0.1947	0.3415	0.2046	0.1018
	Family self-development ability(B3,0.2771)	0.1278	0.2476	0.2778	0.2385	0.1083
Environmental indicator (C,0.0882)	The ability to accept a new lifestyle(C1,0.5583)	0.1047	0.1974	0.3663	0.2014	0.1302
	New environmental adaptability(C2,0.1472)	0.0932	0.2084	0.3381	0.1975	0.1628
	Kinship and neighborhood relationship(C3,0.2945)	0.1335	0.1862	0.3564	0.2019	0.1220
Guarantee indicator (D,0.1296)	The popularity of endowment insurance(D1,0.5836)	0.1646	0.1974	0.3716	0.2283	0.0381
	The popularity of medical insurance(D2,0.2671)	0.1104	0.1805	0.3671	0.2387	0.1033
	The capacity to guarantee homesteads(D3,0.1493)	0.1238	0.1937	0.3573	0.2401	0.0851

Factor set (U_i) is the collection of evaluation factors. The target level factor set is composed of the criterion level factors determined at the target level, while the indicator level factor set is a collection of specific indicator factors corresponding to the criterion level. Namely:

$$U_i = \{u_1, u_2, \ldots, u_m\} \ (i = 1, 2, \ldots, m) \tag{1}$$

where U_i is the set of factors, including the set of factors at the target level and the set of factors at the indicator level; u_i is the i rd evaluation indicator.

III. B. Ranking of risk event evaluations

III. B. 1) Borda ordinal value method

Using the risk matrix method to classify risk factors into five levels, the general distribution of risk events can be expressed, but due to the limited number of levels in the risk matrix, there are still multiple risk events with different probability of occurrence and degree of risk impact in each level, i.e., the number of risk knots is still too large. Therefore, in order to obtain a more accurate and detailed risk ranking and reduce the size of risk nodes, the Borda ordinal value method is used to further evaluate and rank various types of risk events, which is a special algorithm that integrates the degree of risk impact and the probability of occurrence of risk, and divides the results of the risk to reduce the number of risk nodes, which is convenient for accurately locating the key risk events.

(1) Determination of risk occurrence probability ordinal value

The probability of risk occurrence ordinal value is the result of ranking the probability of occurrence of the risk of homestead transfer. The probability of occurrence of risky events includes five levels such as hardly occurring, occasionally occurring, likely to occur, frequently occurring, and extremely likely to occur. Let t=represent the number of degree of probability of possible occurrence of risk events, then $t=\{1,2,3,4,5\}$; let P_t be the probability of occurrence of risk events, then P_1 =high, P_2 =higher, P_3 =general, P_4 =lower, P_5 =lower; let N_t represent the number of risk events with a probability of occurrence of P_t, then the risk occurrence probability ordinal value of risk events of the tth probability of occurrence of risk events class G_t is:

$$G_t = E_t + (1+N_t)/2 \tag{2}$$

where $E_t = \sum_{r=1}^{t-1} N_r \left(t \geq 2, t=1, E_1=0\right)$.

(2) Determination of risk impact degree ordinal value

Risk impact degree ordinal value refers to the results of the ordering of the degree of impact of the risk of the transfer of residential land. The degree of risk impact of the risk event includes five levels: very small, slight, general, large, and very large. Let j represents the number of possible risk impact degree of risk events, then $j=\{1,2,3,4,5\}$; let Q_j is the degree of risk impact, then Q_1 = great, Q_2 = large, Q_3 = general, Q_4 = slight, Q_5 = very small; let M_j represents the degree of risk impact of the number of risk events Q_j, then the risk impact degree of risk events of the jth risk impact degree of the risk impact of the ordinal value of the I_j calculation formula is:

$$I_j = C_j + (1+M_j)/2 \tag{3}$$

where $C_j = \sum_{r=1}^{j-1} M_r \left(j \geq 2, j=1, C_1=0\right)$.

For example, if the number of risk events with a risk impact level of Q_1 (extremely large) is 3, then $M_1=3$, then the risk impact level ordinal value of risk events with a risk impact level of extremely large is $I_1=2$.

(3) Determination of Borda number and ordinal value of each risk event

Borda number is a measure of the risk level of all risk events in the risk of homestead transfer. For a certain risk event, the higher the Borda number, the higher the risk severity level, and the Borda number is calculated as follows:

$$B_i = (N-R_{i1}) + (N-R_{i2}) \tag{4}$$

where B_i is the Borda number of the i type of risk, N is the total number of risk events, R_{i1} is the risk impact degree of the i th type of risk sequence value, R_{i2} is the probability of occurrence of risk events sequence value. After the Borda number of each risk event will be sorted and compared to get the Borda order value, Borda order value is closer to 0, which indicates that the more critical the risk event.

III. B. 2) Analysis of risk probability and risk impact level

According to the data obtained from the questionnaire, it can be obtained that the risk classification of the transfer of homestead land is shown in Table 4. In the dimension of economic indicators, the proportion of agricultural income (A1) and the burden of living (A3) are both of high risk level, with the quantitative value of their risk impact degree reaching 3.51 and 2.15, respectively. The dimension of social indicators shows that the non-agricultural industry

livelihood skills (B2) and the number of owning a residence (B1) have the highest risk level, with the quantitative value of 3.05 and 2.87, respectively, which highlight the key role of social capital accumulation in the risk prevention and control of the farm household. Capital accumulation plays a key role in risk prevention and control. Among the environmental indicators, kinship and neighborhood (C3) has the lowest risk level (quantitative value of 1.54), indicating that the traditional social network still buffers the impact of institutional change to a certain extent. The security indicators show differentiation, with the risk impact of medical insurance penetration (D2) significantly higher than that of pension insurance penetration (D1), a difference that reveals the uneven development of the rural social security system.

Table 4: Classification of Risk Levels for the Transfer of Homesteads

Target layer	Indicator layer	Probability quantification value	Probability of risk occurrence	Quantitative value of the degree of influence	Degree of risk impact	Risk level
A	A1	2.28	General	3.51	Larger	High
	A2	2.36	General	1.63	Slight	Moderate
	A3	3.45	Larger	2.15	General	High
B	B1	3.12	Larger	2.87	General	High
	B2	2.64	General	3.05	Larger	High
	B3	2.18	General	1.92	Slight	Moderate
C	C1	2.75	General	2.43	General	Moderate
	C2	2.31	General	2.68	General	Moderate
	C3	1.87	Slight	1.54	Slight	Low
D	D1	1.92	Slight	2.15	General	Moderate
	D2	3.28	Larger	3.42	Larger	High
	D3	2.05	General	2.37	General	Moderate

III. B. 3) Risk level and Borda ordinal value analysis

Arrange the Borda numbers in descending order to get the Borda value, which can be used to indicate the importance of the risk event.Borda value B: indicates that among all the risk events, the number of risk events that are greater than the Borda value of the ith risk. When the Borda order value is 0, it indicates that the number of risk events higher than the risk level is 0, so it is the most critical risk, i.e., the smaller the Borda order value is, the higher its risk level is. The Borda value and ordinal number of the risk of the transfer of homestead are shown in Table 5.

Health insurance penetration (D2), with a Borda value of 1, is the most critical of all risk factors, with a “high” probability of occurrence and impact. Agricultural income (A1), burden of living (A3), non-agricultural livelihood skills (B2), and number of dwellings (B1) all have a Borda value of 2 and constitute the second risk tier. The medium-risk tier (Borda value 4-5) consists of the ability to accept new lifestyles (C1), the ability to adapt to new environments (C2), the ability of households to develop themselves (B3), and the prevalence of old-age insurance (D1), which do not pose a direct threat, but may amplify systemic risk through cumulative effects. The kinship neighborhood (C3) has the highest Borda ordinal value and the lowest risk level, which is consistent with the stability of traditional rural social relationship networks.

Table 5: Borda values and Ordinal Numbers of the Risk of Homestead Transfer

Target layer	Indicator layer	Probability of risk occurrence	The sequential value of the probability of risk occurrence	Degree of risk impact	Sequential value of the degree of risk impact	Borda number	Borda order value
A	A1	General	4	Larger	2	6	2
	A2	General	4	Slight	6	10	5
	A3	Larger	2	General	4	6	2
B	B1	Larger	2	General	4	6	2
	B2	General	4	Larger	2	6	2
	B3	General	4	Slight	6	10	5
C	C1	General	4	General	4	8	4
	C2	General	4	General	4	8	4
	C3	Slight	6	Slight	6	12	6

D	D1	Slight	6	General	4	10	5
	D2	Larger	2	Larger	2	4	1
	D3	General	4	General	4	8	4

The distribution of risk classes based on the Borda ordinal value method is shown in Figure 1. The further division by the Borda ordinal value method reduces the size of the risk knots in each class and obtains a more detailed ordering of the risk event classes.

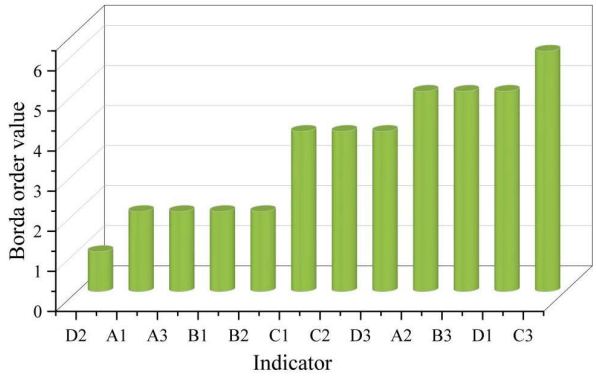

Figure 1: Risk grade distribution based on Borda ordinal value method

III. C. Fuzzy synthesized evaluation results

Based on the risk level score, the individual farmer's risk score is 57.37, which is between [40,60], indicating that the risk level is at the medium alarm level. This value is close to the upper limit of the medium alarm and the lower limit of the heavy alarm, which indicates that it is necessary to pay attention to and do a good job in the risk prevention measures of the transfer of homesteads, to control the risk in the controllable range of the medium-alarm level, and to prevent the risk from further expanding to the heavy-alarm level to cause social hazards.

Although the individual risk of farmers is at the medium alarm level, the internal indicators have differences, and the fuzzy evaluation results of the evaluation indicators of each layer are shown in Table 6. According to the principle of maximum affiliation, the economic, social, environmental and security indicators of farm households are all at the medium alarm level, but the proportion of household agricultural income in the economic indicators, the self-development capacity of households in the social indicators and the adaptive capacity of the new environment in the environmental indicators are all at the heavy alarm level, which means that farm households with mainly agricultural income, weak self-development capacity and adaptive capacity of the new environment need to treat the transfer of their homesteads with caution and prevent the transfer of their homesteads from causing social hazards. This means that farmers with mainly agricultural income and weak ability of self-development and adaptation to the new environment need to be cautious about the transfer of their residential land and prevent the risks that may arise from the transfer of residential land. The evaluation results of the other indicators are all medium and light alarms, which have a relatively small impact on the risks arising from the transfer of rural residential land.

Table 6: Fuzzy evaluation results of evaluation indicators at each level

Target layer	Maximum membership degree	Indicator layer	Maximum membership degree
A(Central police)	0.3574	A1(Heavy police)	0.4535
		A2(Light police)	0.3308
		A3(Central police)	0.3308
B(Central police)	0.2889	B1(Central police)	0.3197
		B2(Central police)	0.3197
		B3(Central police)	0.3356
C(Central police)	0.3201	C1(Central police)	0.3381
		C2(Heavy police)	0.3193
		C3(Central police)	0.3156
D(Central police)	0.2974	D1(Central police)	0.3255
		D2(Light police)	0.2371
		D3(Central police)	0.2675

III. D. Analysis of risk influencing factors

In this paper, the transfer behavior of farmers' homestead use right is taken as an explanatory variable, risk aversion attitude and risk perception are selected as explanatory variables, and the control variables are selected as indicators from three aspects, namely, farmers' characteristics, family characteristics, and homestead resource endowment characteristics.

III. D. 1) Correlation analysis

After Pearson correlation analysis to measure the linear relationship between farmers' perception of the risk of transfer of homestead respectively and the factors, the larger the absolute value of the correlation coefficient, the stronger the correlation.The results of Pearson correlation analysis are shown in Table 7. Farmers' perception of homestead transfer risk shows a consistent pattern in different regions, but there are also regional differences. The correlation coefficients of economic risk perception are high in all three regions and all are significant at the 1% level, indicating that economic factors are the core variables affecting farmers' decision-making. The correlation of social risk perception is slightly lower than that of economic risk, but it is still significantly positive. Psychological risk perception is significant at the 5% level in regions X and Z, but significant at the 10% level in region Y, which may reflect that farmers in region Y have a stronger psychological adaptability to the transfer of homestead. Risk aversion attitude is significantly positively correlated with risk perception, which verifies the applicability of risk aversion theory in behavioral economics in the transfer of homestead.

Table 7: Pearson Correlation Analysis Results

Influencing factor	Region		
	X	Y	Z
Perception of economic risk	0.421***	0.383***	0.452***
Perception of social risk	0.316**	0.295**	0.334**
Perception of psychological risk	0.257**	0.223*	0.284**
Risk aversion	0.373**	0.348**	0.412**
Age	-0.184**	-0.218**	-0.166**
Educational level	0.274*	0.245*	0.301**
Total number of family members	0.124***	0.153**	0.092***
Household annual income level	-0.331	-0.302	-0.365
Homestead area	0.192**	0.163***	0.225**
House cost	0.231*	0.203	0.264*

III. D. 2) Basic regression results

Model 1 empirically examines the effects of risk perception and risk aversion on farmers' homestead use right transfer behavior, and calculates their marginal effects. In order to examine the moderating effect of risk perception on risk aversion inhibiting the transfer of farmers' homestead use right, the interaction term of risk perception and risk aversion is introduced in Model 2. The basic regression results are shown in Table 8, the factors that significantly affect the transfer behavior of farmers' homestead right to use under the three-rights division are farmers' economic risk perception, social risk perception, psychological risk perception and farmers' risk aversion attitude, and the estimation results are analyzed as follows.

The estimation results are analyzed as follows.

(1) The impact of risk perception on the transfer of homestead use right of farmers. The economic risk perception, social risk perception and psychological risk perception of the transfer of homestead use right have a significant negative impact on the transfer of homestead use right of farmers, which are significant at the 1%, 5% and 5% levels, respectively. For each level of economic risk perception reduction, farmers' homestead transfer behavior improves by 4.286%. For each level of social risk perception, the probability of transferring homesteads of farm households increases by 7.083%. For each level of psychological risk perception, the probability of transferring homesteads of farm households increases by 2.588%.

(2) The impact of risk aversion on farmers' transfer of homestead use rights. Risk aversion has a significant negative effect on farmers' behavior of transferring homesteads, which is significant at the 1% level. For each level of risk aversion attitude, the behavior of transferring homesteads of farm households decreases by 2.974%. Farmers are mostly risk-averse, and the transfer of homesteads is affected by the superposition of multiple risks of policy, location and market, and there is considerable uncertainty in gains and losses.

(3) The influence of control variables on farmers' transfer of homestead use right. Among the characteristics of farm households, age and education level significantly and positively affect the transfer of the right to use farmland. Among the household characteristics, the more labor force a farm household has, the more likely it is to be willing to transfer homesteads. Among the characteristics of homestead resource endowment, the larger the homestead area, the more willing farmers are to transfer homesteads.

Table 8: Basic Regression Results

Variable	Model 1		Marginal effect	Model 2	
	Coefficient	Standard error		Coefficient	Standard error
Perception of economic risk	-0.294***	0.063	-4.286	-0.238***	0.065
Perception of social risk	-0.401**	0.058	-7.083	-0.411**	0.069
Perception of psychological risk	-0.162**	0.042	-2.588	-0.167**	0.058
Risk aversion	-0.194***	0.039	-2.974	-0.184***	0.051
Age	0.022*	0.217	0.331	0.022**	0.025
Educational level	0.071**	0.055	1.275	0.077***	0.129
Total number of family members	0.218***	0.033	3.286	0.218***	0.029
Household annual income level	0.072	0.082	1.104	0.073	0.503
Homestead area	0.487***	0.091	7.864	0.366***	0.047
House cost	-0.105	0.024	-1.386	-0.083	0.264
Perception of economic risk*Risk aversion				-0.234**	0.071
Perception of social risk*Risk aversion				-0.245*	0.032
Perception of psychological risk*Risk aversion				-0.193	0.062
Sample size	500			500	
Wald chi^2	169.43***			189.47***	
Pseudo R^2	0.1486			0.1512	

III. D. 3) Heterogeneity analysis

With the advancement of urbanization and the transfer of a large number of people, more and more farm houses are idle, and the transfer of homesteads has become an inevitable trend of deepening the reform of rural land. The realization of the transfer of residential land requires the balance of the interests of all parties, including the farmers' perception of the value of their own farmhouses, the farmers' perception of the risk of transferring residential land and risk avoidance attitude, and the market value of the residential land's location. The results of the impact of risk aversion attitude and risk perception on the transfer behavior of farmers in different districts are shown in Table 9. In terms of economic risk perception, the strongest negative influence is found in region Z, the weakest in region X, and the middle in region Y. This is consistent with the finding of the highest correlation of economic risk perception in region Z in Table 7, indicating that farmers in this region are more sensitive to economic risk. The effect of social risk perception is most significant in region Y. Psychological risk perception is significant only in region Z. Risk aversion attitudes show the strongest inhibitory effect in region Y, with similar levels of effect in regions X and Z. This is consistent with the economic reality of lower per capita income in region Y, and validates the theoretical expectation that economic stress reinforces risk aversion tendencies.

Table 9: Results of farmer household influence in different districts

Variable	X	Y	Z
Perception of economic risk	-0.251**(0.072)	-0.276***(0.068)	-0.302***(0.071)
Perception of social risk	-0.328*(0.065)	-0.371**(0.063)	-0.354**(0.069)
Perception of psychological risk	-0.142(0.048)	-0.118*(0.051)	-0.187*(0.053)
Risk aversion	-0.168**(0.042)	-0.203***(0.041)	-0.176**(0.045)
Other Variables	Controlled	Controlled	Controlled
Observed value	134	202	164
Pseudo R^2	0.119	0.093	0.108

IV. Conclusion

This study systematically analyzes the power structure and risk characteristics of the right to qualify for a homestead, and draws the following conclusions.

(1) The Borda value of health insurance popularity (D2) is 1, which is the most critical among all risk factors, and its probability of occurrence and degree of influence are both in the “large” level. The risk score of individual farmers is 57.37, which is at the medium alarm level but close to the heavy alarm threshold.

(2) Economic risk perception, social risk perception and psychological risk perception have significant negative impacts on the transfer of farmers' homestead use right, which are significant at the 1%, 5% and 5% levels, respectively. Risk aversion has a significant negative effect on farmers' homestead transfer behavior, which is significant at 1% level. Among the control variables, age and education level significantly and positively affect the transfer behavior of farmers' homestead use right, and the more labor force farmers' families are more likely to be willing to transfer homesteads. Heterogeneity analysis shows that X, Y and Z show gradient differences, reflecting the deep impact of regional development imbalance on policy implementation.

Funding

This work was supported by ministry of education humanities and social sciences research planning fund project: 'research on the incentive mechanism of homestead exit based on equity theory' (23YJAZH230) and Henan philosophy and social science planning annual project: 'research on the construction of incentive mechanism for homestead exit from the perspective of farmers' (2023BJJ023).

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