

# Research on welfare difference of different employment channels of rural land transfer households based on quantile regression model

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**Abstract:** *Measuring the disparities in the welfare changes of rural households after the transfer of agricultural land through different employment channels, this study analyzes the differential impact of employment channels on the welfare changes of rural households at different percentiles post-land transfer. The aim is to provide a scientific basis for guiding land transfer, precisely assisting various types of land-transferring households, and ensuring effective reemployment support for farmers. Employing a combination of questionnaire surveys and a fuzzy comprehensive evaluation model, the analysis reveals an improvement in the welfare conditions of land-transferring households after land transfer. Disparities exist in the welfare changes of land-transferring households across different employment channels. The study suggests the following recommendations: promoting land transfer in a reasonable manner to boost the welfare of farmers, advancing rural industrial revitalization, enhancing the rural employment system, and providing targeted assistance to various types of farming households to elevate their overall welfare.*

**Keywords:** *Transfer of agricultural land to households; Different employment channels; Farm household welfare*

## 1. Introduction

Since the introduction of the Rural Revitalization Strategy, the national government has intensified transfer payments through rural industrial projects, encouraging social capital investment in agriculture and expanding the demand for land transfer markets<sup>[1]</sup>. Simultaneously, regions across the country have facilitated the rapid and orderly transfer of land operating rights, propelling the swift progress of land transfer. According to the Annual Report on Chinese Agricultural Policy and Reform Statistics, in 2021 alone, the area of contracted farmland under rural land transfer reached 14.274 million acres, a 5.0% increase from 2020. As a result, households engaged in land transfer were freed from land constraints, and their employment opportunities expanded beyond traditional farming.

The shift in employment channels for rural land-exiting households has diverse impacts on their welfare levels. On one hand, households engaged in non-agricultural work after land transfer gain additional income, leading to improved living conditions and an enhanced welfare level<sup>[2]</sup>. Research indicates that non-agricultural employment for land-exiting households can boost economic income, aiding in addressing rural poverty and educational challenges for rural children, ultimately elevating household welfare<sup>[3-8]</sup>. On the other hand, losing access to land as an economic source after land transfer disrupts the family's retirement foundation<sup>[9]</sup>. The transition to non-agricultural employment may pose challenges for reemployment, potentially lowering the welfare level for land-exiting households<sup>[10]</sup>. Some households, upon leaving agricultural land, might migrate to urban areas for higher-paying but unfamiliar and physically demanding jobs, resulting in various issues such as increased psychological stress, impacting the overall improvement of household welfare<sup>[11]</sup>. Additionally, research has found that different employment channels have heterogeneous impacts on the welfare changes of households at different quantiles<sup>[12]</sup>.

Existing studies have primarily conducted longitudinal welfare comparisons for households before and after land transfer and regional comparisons before and after land transfer<sup>[13-15]</sup>. Some studies have also performed horizontal welfare comparisons for different age groups and other factors after reemployment<sup>[16]</sup>. However, in the examination of welfare changes among land-exiting households under different employment channels, most scholars have categorized based on agricultural involvement

without further differentiation.

Building on the foundation of domestic and international research, this study employs Sen's Capability Approach to construct a welfare evaluation indicator system for land-exiting households. It categorizes employment channels more finely, compares the welfare changes of land-exiting households under different employment channels after land transfer.

## 2. Overview of the Study Area and Basic Characteristics of the Sample

### 2.1 Regional Overview

The study area must meet the following two requirements: ① It should exhibit a substantial amount of land transfer activities and rural land-exiting households; ② There should be a diverse range of rural employment channels. Taking into consideration factors such as research feasibility, this paper selects certain areas within the Wuhan metropolitan area as the study region. The Wuhan metropolitan area is composed of nine cities, including Wuhan, Huangshi, Ezhou, Xiaogan, Huanggang, Xianning, Xiantao, Tianmen, and Qianjiang. This region features multiple exemplary areas for rural industrial revitalization, witnessing a significant amount of land transfer activities, resulting in numerous rural land-exiting households. Moreover, local industrial development has generated a substantial number of new job opportunities.

During the research process, 1-2 districts were randomly selected from each prefecture-level city, and 1-2 towns were randomly selected from each district. A random selection of several villages in each town was then conducted for household surveys, focusing on rural land-exiting households in the specified region. The research began in 2022, and a total of 325 valid questionnaires were collected.

### 2.2 Basic Characteristics of the Sample

The employment channels for rural land transfer households in the research area include civil servants, public institutions, village cadres, migrant workers, family farms, independent entrepreneurship, local enterprises, agricultural cooperatives, and other employment channels. To analyze the differences in the impact of emerging rural employment types and migrant work on the welfare of farmers, five types of employment channels, including civil servants, village cadres, public institutions, family farms, independent entrepreneurship, local enterprises, and agricultural cooperatives, were summarized as local employment.

The employment information of the surveyed sample farmers is shown in Table 1. The number of migrant workers is the highest, accounting for nearly 60%, with 192 households. Local employed farmers account for only 28%, less than one-third, and a large number of people go out to work. Among local employed farmers, the proportion of various types of farmers is relatively scattered, with the largest number of farmers employed in local enterprises, but only 41 households, accounting for less than 13%.

*Table 1: Type of rural land transfer out households*

Farmer type	Local employed farmers					Rural migrant workers	Other employed farmers	Sum
	A	C	D	E	F	B	G	
number	30	2	12	41	5	192	43	325
sum	90							
Proportion	9	1	4	13	2	59	13	100
sum	28							

Note: A= Civil servants, village cadres, and employed farmers in public institutions B= Rural migrant workers C=Family farm employed farmers D= Entrepreneurial farmers E= Local enterprise employed farmers F= Farmers employed by agricultural cooperatives G= Other employed farmers.

## 3. Research Methods and Design

### 3.1 Sen's "Capability Approach" Evaluation Method and Indicator Construction

Amartya Sen's Capability Approach posits that the welfare impact on individuals is not solely determined by the commodities themselves but by the functions and capabilities these commodities can provide<sup>[17]</sup>. This theory has been widely applied in measuring the welfare of households<sup>[18-21]</sup>. Drawing

on Sen's "Capability Approach," this study focuses on rural land-exiting households and measures the welfare changes before and after land transfer under different employment channels. Referring to the selection of indicators in relevant literature<sup>[22-24]</sup>, the paper adopts five functional subsets, namely "economic conditions, transparency protection, protective guarantees, social opportunities, and political freedom." For each functional subset, 3-4 indicators are chosen, forming the welfare evaluation system, as illustrated in Table 2.

Table 2: Descriptive statistics and connotation of welfare evaluation indicators for rural land transfer households

Target layer	Functional subset	Primary evaluation indicators	number	average value	standard deviation	connotation
Farmer welfare	Economic situation	Changes in operating income	325	2.554	0.937	Changes in family income from operating activities over the past year
		Changes in salary income		3.366	0.706	Changes in total annual household salary income
		Changes in transfer income		3.588	0.664	The annual total amount change mainly includes transfer income such as pension, relief, dowry, etc
		Changes in property income		3.055	0.536	Annual income changes in household movable and immovable property
	Social opportunities	Changes in educational resources	325	3.231	0.582	Mainly refers to changes in the difficulty and quality level of children's education
		Changes in social situations		3.369	0.867	Mainly referring to changes in social and neighborhood relationships
		Changes in leisure time		3.502	0.898	Changes in leisure and entertainment time and content
		Changes in health status		3.022	0.487	Changes in overall physical condition of family members
	Political freedom	Work unit participation satisfaction	325	3.077	0.553	Changes in satisfaction with participation in various activities at the workplace
		Satisfaction with participation in village meetings		3.049	0.601	Changes in satisfaction with participation in voting, suggestions, and other activities at the village assembly
		Satisfaction with community activity participation		3.080	0.598	Changes in satisfaction with participation in various community activities
		Satisfaction with social activity participation		3.080	0.550	Changes in satisfaction with participation in various social activities
	Protective protection	Changes in residential environment	325	3.468	0.700	Changes in surrounding ecology, hygiene, noise, etc
		Changes in public security situation		3.440	0.703	Changes in village/community security situation
		Per capita housing area		3.055	0.404	Changes in household housing area
		Housing area conversion		3.477	0.696	Changes in residential location, decoration, etc
	Transparency protection	The difficulty level of employment	325	3.206	0.581	Changes in employment convenience
		Satisfaction with future development prospects		3.754	0.886	Changes in satisfaction with personal and family future development
		Social security changes		3.188	0.939	Mainly involving various security changes

Note: The indicators are all compared with the current situation and the year before land transfer. The primary evaluation indicators are virtual qualitative variables and assigned values based on their specific situations, such as changes in total household income. The questionnaire options are set to: decrease more, slightly decrease, keep unchanged, slightly increase, and increase more, with values assigned as 1, 2, 3, 4, and 5 in sequence. According to the research data, the maximum value of 19 indicators is 5, and the minimum value is 1.

**3.2. Determine membership function**

Utilizing the fuzzy evaluation method, the welfare level of households is represented as a fuzzy subset X. Assuming that the welfare formed by various functional activities of households is a subset W of X, the welfare function for the pth household can be expressed as  $W^{(p)} = \{x|\mu(x)\}$ . Here,  $x \in X$ , and  $\mu(x)$  is the membership degree of x to W, with  $\mu(x) \in [0,1]$ . Let  $\mu(x)$  denote the welfare level, where  $x_{ij}$  represents the primary evaluation indicator for the ith functional subset of household welfare, and  $x_i$  represents the ith functional subset of household welfare. The subscript j ( $x_{ij}$ ) indicates the measurement of the jth primary evaluation indicator for the ith functional subset. In this study, all selected indicators are virtual qualitative variables, and the formula is as follows.

$$\mu(x_{ij}) = \begin{cases} 0 & x_{ij} \leq x_{ij}^{\min} \\ \frac{x_{ij} - x_{ij}^{\min}}{x_{ij}^{\max} - x_{ij}^{\min}} & x_{ij}^{\min} < x_{ij} < x_{ij}^{\max} \\ 1 & x_{ij} \geq x_{ij}^{\max} \end{cases} \quad (1)$$

In the computation results, if the welfare membership degree is  $>0.5$ , the household's welfare improves after land transfer. If the membership degree is  $<0.5$ , the household's welfare deteriorates after land transfer. When the membership degree is close to 0.5, it indicates that the welfare condition remains relatively unchanged after land transfer.

**3.3. Determine membership function**

This paper employs the CRITIC method to calculate indicator weights. The CRITIC method is an objective weighting approach that comprehensively considers the comparative intensity and conflicts within indicator data<sup>[25]</sup>. The specific implementation steps are as follows:

Normalization processing:

$$\omega_j^{(p)} = \frac{\mu(x_j)^{(p)} - \min_j[\mu(x_j)^{(p)}]}{\max_j[\mu(x_j)^{(p)}] - \min_j[\mu(x_j)^{(p)}]} \quad (2)$$

$\omega_j^{(p)}$  represents the normalized membership degree value of the jth primary indicator for the pth household after processing,  $\mu(x_j)^{(p)}$  represents the membership degree value of the jth primary evaluation indicator for the pth household.  $\min_j[\mu(x_j)^{(p)}]$  denotes the minimum membership degree value for the jth indicator, and  $\max_j[\mu(x_j)^{(p)}]$  represents the maximum membership degree value for the jth indicator.

$$\bar{\omega}_j = \frac{\sum_{p=1}^n \omega_j^{(p)}}{n} \quad (3)$$

$$s_j = \left(\frac{1}{n} \sum_{p=1}^n (\omega_j^{(p)} - \bar{\omega}_j)^2\right)^{1/2} \quad (4)$$

$$p_j = \frac{\bar{\omega}_j}{s_j} \quad (5)$$

$p_j$  is the coefficient of variation, and n is the number of households.

Calculation of correlation coefficient:

$$q_{kj} = \frac{\text{cov}(k,j)}{s_k s_j}, k = 1, 2, \dots, m; j = 1, 2, \dots, m \quad (6)$$

$q_{kj}$  represents the correlation coefficient between indicators k and j,  $\text{cov}(k,j)$  denotes the covariance between indicators k and j, and m is the number of indicators.

Information calculation:

$$\beta_j = p_j \sum_{i=1}^n (1 - q_{kj}), j = 1, 2, \dots, m, k = 1, 2, \dots, m \quad (7)$$

Weight calculation:

$$a_j = \frac{\beta_j}{\sum_{j=1}^m \beta_j}, j = 1, 2, \dots, m \quad (8)$$

$a_j$  is the weight corresponding to the primary indicator j, and m is the number of primary indicators.

The CRITIC weight calculation was carried out using SPSSAU, and the final weight calculation results are shown in Table 3.

Table 3: CRITIC Weight Calculation Results

Functional subset	Weight	Primary evaluation indicators	Indicator variability	Indicator Conflict	amount of information	weight
Economic situation	0.2476	Changes in operating income	0.937	17.666	16.549	8.52%
		Changes in salary income	0.706	16.312	11.514	5.92%
		Changes in transfer income	0.664	17.207	11.421	5.88%
		Changes in property income	0.536	16.094	8.623	4.44%
Social opportunities	0.2288	Changes in educational resources	0.582	14.277	8.307	4.27%
		Changes in social situations	0.867	16.004	13.880	7.14%
		Changes in leisure time	0.898	16.282	14.621	7.52%
		Changes in health status	0.487	15.753	7.672	3.95%
Political freedom	0.1538	Work unit participation satisfaction	0.553	13.263	7.334	3.77%
		Satisfaction with participation in village meetings	0.601	13.052	7.851	4.04%
		Satisfaction with community activity participation	0.598	12.631	7.555	3.89%
		Satisfaction with social activity participation	0.550	13.000	7.146	3.68%
Protective protection	0.1864	Changes in residential environment	0.700	13.800	9.665	4.97%
		Changes in public security situation	0.703	14.773	10.384	5.34%
		Per capita housing area	0.404	16.052	6.492	3.34%
		Housing area conversion	0.696	13.938	9.705	4.99%
Transparency protection	0.1833	The difficulty level of employment	0.581	14.931	8.668	4.46%
		Satisfaction with future development prospects	0.886	14.448	12.800	6.59%
		Social security changes	0.939	15.081	14.158	7.28%

3.4. Calculation of functional subsets and welfare membership of overall farmers

Functional subset weight calculation:

$$a_i = \sum_{j=1}^n a_{ij} / \sum_{i=1}^m \sum_{j=1}^n a_{ij}, i = 1,2 \dots, n \quad j = 1,2, \dots, n \tag{9}$$

$a_i$  stands for the weight of the  $i$ th functional subset for the household, where  $m$  is the number of functional subsets, and  $n$  is the number of primary indicators in the  $i$ th functional subset.

Calculation of functional subset membership degree:

$$\mu(x_{ij}) = \overline{\mu(x_{ij})}^{(p)} \tag{10}$$

$$\mu(x_i) = \sum_{j=1}^n \mu(x_{ij}) \times a_{ij}, j = 1,2 \dots, n \tag{11}$$

$\mu(x_{ij})$  represents the membership degree of the  $j$ th primary indicator in the  $i$ th functional subset for the overall households.  $\overline{\mu(x_{ij})}^{(p)}$  denotes the average membership degree of the  $j$ th primary indicator in the  $i$ th functional subset across all households.  $\mu(x_i)$  stands for the overall membership degree of the  $i$ th functional subset for all households, while  $a_{ij}$  represents the weight of the  $j$ th primary indicator in the  $i$ th functional subset for the household.  $n$  is the number of primary indicators in the  $i$ th functional subset.

Overall farmer welfare calculation:

$$W = \sum_{i=1}^m \mu(x_i) \times a_i, i = 1,2 \dots, m \tag{12}$$

$W$  represents the overall welfare of households, and  $\mu(x_i)$  signifies the overall membership degree of the  $i$ th functional subset for all households.  $m$  is the number of functional subsets for households, and  $a_i$  stands for the weight of the  $i$ th functional subset for households.

Welfare calculation for individual farmers:

$$\mu(x_i)^{(p)} = \sum_{j=1}^n \mu(x_{ij})^{(p)} \times a_{ij}, j = 1,2 \dots, n \tag{13}$$

$\mu(x_{ij})^{(p)}$  is the membership degree of the  $j$ th primary indicator in the  $i$ -th functional subset of the  $p$ -th household  $\mu(x_i)^{(p)}$  is the membership degree of the  $i$ -th functional subset of the  $p$ -th household,  $a_{ij}$  is the weight of the  $j$ th primary indicator of the  $i$ th functional subset of the household, and  $n$  is the number of primary indicators of the  $i$ -th functional subset.

$$W^{(p)} = \sum_{i=1}^m \mu(x_i)^{(p)} \times a_i, i = 1,2 \dots, m \tag{14}$$

$W^{(p)}$  represents the welfare membership degree for the pth household, and  $\mu(x_i)^{(p)}$  signifies the membership degree of the ith functional subset for the pth household. m is the number of functional subsets for households, and  $a_i$  denotes the weight of the ith functional subset for the household.

The welfare value for rural land-exiting households under various employment channels is the average of individual household welfare values within that specific employment category<sup>[26]</sup>.

#### 4. Comparative Analysis of Welfare for Farmers Transferring Farmland through Different Employment Channels

Table 4: Welfare measurement results of different employment channels for rural land transfer households

Functional Subsets and Primary Evaluation Indicators		Membership degree								
		Whole	Local employed farmers						Rural migrant workers	Other employed farmers
			A	C	D	E	F	Total	B	G
Economic situation	Changes in operating income	0.39	0.44	0.50	0.67	0.32	0.55	0.43	0.37	0.41
	Changes in salary income	0.59	0.62	0.50	0.56	0.65	0.55	0.62	0.59	0.52
	Changes in transfer income	0.65	0.68	0.75	0.60	0.72	0.55	0.68	0.63	0.64
	Changes in property income	0.51	0.52	0.50	0.63	0.49	0.50	0.52	0.51	0.52
	Whole	0.52	0.55	0.56	0.62	0.52	0.54	0.55	0.51	0.51
Social opportunities	Changes in educational resources	0.56	0.56	0.50	0.60	0.56	0.80	0.58	0.54	0.59
	Changes in social situations	0.59	0.60	0.63	0.56	0.58	0.80	0.60	0.58	0.65
	Changes in leisure time	0.63	0.60	0.63	0.63	0.56	0.85	0.60	0.62	0.69
	Changes in health status	0.51	0.52	0.50	0.52	0.52	0.60	0.52	0.50	0.49
	Whole	0.58	0.58	0.58	0.58	0.56	0.78	0.58	0.57	0.62
Political freedom	Work unit participation satisfaction	0.52	0.58	0.50	0.52	0.55	0.80	0.57	0.50	0.50
	Satisfaction with participation in village meetings	0.51	0.58	0.50	0.54	0.54	0.80	0.57	0.49	0.51
	Satisfaction with community activity participation	0.52	0.58	0.50	0.58	0.52	0.85	0.57	0.50	0.51
	Satisfaction with social activity participation	0.52	0.60	0.63	0.54	0.53	0.85	0.58	0.50	0.50
	Whole	0.52	0.59	0.53	0.55	0.54	0.82	0.57	0.50	0.50
Protective protection	Changes in residential environment	0.62	0.60	0.50	0.73	0.65	0.85	0.65	0.60	0.63
	Changes in public security situation	0.61	0.57	0.50	0.69	0.64	0.80	0.63	0.59	0.65
	Per capita housing area	0.51	0.54	0.63	0.54	0.50	0.60	0.53	0.51	0.51
	Housing area conversion	0.62	0.62	0.63	0.73	0.65	0.85	0.66	0.59	0.65
	Whole	0.60	0.58	0.56	0.68	0.62	0.79	0.63	0.58	0.62
Transparency protection	The difficulty level of employment	0.55	0.58	0.50	0.63	0.59	0.75	0.59	0.54	0.53
	Satisfaction with future development prospects	0.69	0.79	0.75	0.81	0.66	0.75	0.73	0.67	0.70
	Social security changes	0.55	0.68	0.38	0.67	0.60	0.70	0.64	0.51	0.53
	Whole	0.60	0.70	0.54	0.71	0.62	0.73	0.66	0.57	0.59
	Total welfare	0.56	0.60	0.56	0.63	0.57	0.72	0.59	0.55	0.57

Note: A= Civil servants, village cadres, and employed farmers in public institutions B= Rural migrant workers C=Family farm employed farmers D= Entrepreneurial farmers E= Local enterprise employed farmers F= Farmers employed by agricultural cooperatives G= Other employed farmers.

According to Table 4, the overall membership degree of welfare for rural land transfer out households is 0.56>0.5, and the overall welfare of rural land transfer out households has improved after land transfer.

Comparing the welfare changes of migrant workers and local employed farmers, both have welfare membership degrees greater than 0.5, and the welfare situation has improved after the transfer of agricultural land. Local employed farmers are better than migrant workers, while the welfare improvement of other employed farmers is between the two types of farmers.

The seven types of farmers are ranked in descending order based on their welfare membership: employed farmers in agricultural cooperatives (0.72)>self-employed farmers (0.63)>employed farmers in civil servants, village cadres, and public institutions (0.60)>employed farmers in local enterprises (0.57) = other employed farmers (0.57)>employed farmers in family farms (0.56)>migrant workers (0.55)>0.5. The welfare of seven types of employment for farmers has been improved, with agricultural cooperatives showing the greatest improvement in welfare for employed farmers, followed by self-employed farmers. The welfare improvement for family rural employed farmers is relatively low, while the welfare improvement for migrant workers is the lowest.

## 5. Research conclusions and policy recommendations

### 5.1 Research conclusion

This article is based on the feasible ability theory of Sen and constructs a welfare evaluation index system for rural land transfer households. From five aspects: economic conditions, social opportunities, political freedom, protective protection, and transparency protection, 19 indicators are selected and a fuzzy comprehensive evaluation model is used to systematically evaluate the welfare of rural land transfer households. The welfare changes of rural land transfer households in different employment channels after land transfer are compared, and comprehensively using OLS regression and quantile regression to analyze the impact of employment channels on welfare improvement at different quantiles, the following conclusions are finally drawn:

(1) After the land transfer, the overall welfare situation of rural land transfer households has been improved. Land transfer helps to increase the property income of farmers, the increase in land transfer prices helps to improve the welfare of rural land transfer households, and the signing of land transfer contracts and the increase in land transfer area of farmers to some extent help to improve the welfare of rural land transfer households.

(2) After land transfer, the welfare changes of rural land transfer households through different employment channels are inconsistent. Compared to the overall welfare changes, local employment is more conducive to improving the welfare of farmers compared to migrant work. However, according to research data, the proportion of migrant workers in China and abroad is nearly 60%, while the proportion of locally employed farmers is less than 30%. The proportion of migrant workers is much higher than that of locally employed farmers, which is not conducive to improving the welfare of farmers. Among the seven types of farmers, agricultural cooperatives have the greatest improvement in the overall welfare situation of employed farmers. Compared to migrant work, local employment, independent entrepreneurship, and employment for civil servants, village cadres, and public institutions are more conducive to improving the welfare of farmers.

### 5.2 Policy recommendations

(1) Reasonably promote land transfer and assist in improving the welfare of farmers

Actively promote land transfer, release labor force, promote multi-channel employment for farmers, and improve their welfare. When conducting land transfer, a good rural land transaction system should be established, the scale of land transfer should be expanded, the legality of land transfer behavior should be guaranteed, and stable land transfer prices should be guaranteed.

(2) Promote the revitalization of rural industries and improve the rural employment system

Relevant departments should promote the revitalization of rural industries, enrich local industries in rural areas, meet the local re employment needs of rural land transfer households, and improve the welfare of farmers. Relevant departments should provide assistance and promotion to agricultural cooperatives, increase support for farmers to start their own businesses, assist local rural enterprises, improve the rural employment system, and enhance the welfare of farmers.

(3) Accurately assisting various types of farmers and improving their welfare

Regarding the transfer of migrant workers and farmers to other households, relevant departments should ensure the implementation of their social security, guide them to participate in various political, cultural, and entertainment activities, and pay attention to the education of their children; Relevant departments should strengthen economic assistance to cooperative organizations, provide appropriate special subsidies, and improve the economic situation of cooperative members; Relevant departments should increase their support for rural independent entrepreneurship and improve the welfare of farmers; Rural local enterprises should focus on improving the non economic welfare of farmers; The government should pay attention to the medical and elderly security issues of farmers working on family farms.

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