land

MDPI

Article

Employment Transfer of Rural Female Labor and Family Welfare Effect in Mountainous Areas: An Empirical Analysis Based on Panel Data

Yue Shui [1,*], Jia Zhong [2], Yingjie Yang [1], Yajie Zeng [3] and Shaoquan Liu [4,*]

1 College of Tourism and Urban Rural Planning, Chengdu University of Technology, Chengdu 610059, China
2 School of Emergency Management, Xihua University, Chengdu 610039, China
3 Institute for Disaster Management and Reconstruction, Sichuan University, Chengdu 610065, China
4 Institute of Mountain Hazards and Environment, Chinese Academy of Sciences, Chengdu 610041, China
* Correspondence: shuiyue@cdut.edu.cn (Y.S.); liushq@imde.ac.cn (S.L.); Tel.: +86-130-7280-7630

Abstract: Improving the understanding of rural female labor employment transfer and its impact on family welfare is of great significance to the improvement of rural family welfare and the rational transfer of labor forces. However, there are few studies on the effect of rural female transfer and there is a lack of comprehensive quantitative measurement and mechanism analysis of influences of female employment transfer on themselves and their families. Based on the peasant household survey in the mountainous rural areas of Sichuan Province, China, in 2013, 2016, and 2019, results were organized as panel data and divided the employment features into three aspects: employment industry, employment locations and whether the migrant was working or not. The family welfare effects (impact on children and impact on the elderly) of rural female labor transfer for employment were investigated by using the fixed effect and random effect regression models. Some major conclusions could be drawn: (1) age, education degree, employment industry and locations of rural females all had a significant impact on their children's education degree; (2) age, urbanization rate and industry of rural females had a significant impact on their number of children; (3) age, education degree of females, employment location and urbanization rate had a significant positive influence on the number of elderly in the family: only the age of rural females had a significant negative influence on the health condition of the elderly. This study can enhance our understanding of the relationship between rural women's employment and family welfare effects, the results can provide a reference for rural women's rational employment mobility and maximizing of family welfare.

Keywords: employment; rural; female labor; family welfare effect; panel data

Citation: Shui, Y.; Zhong, J.; Yang, Y.; Zeng, Y.; Liu, S. Employment Transfer of Rural Female Labor and Family Welfare Effect in Mountainous Areas: An Empirical Analysis Based on Panel Data. *Land* **2022**, *11*, 2134. https://doi.org/10.3390/land11122134

Academic Editor: Hossein Azadi

Received: 31 October 2022
Accepted: 24 November 2022
Published: 26 November 2022

1. Introduction

China's expanding urbanization and economic development have provided a large number of jobs for migrant workers. Driven by economic interests, a large number of rural laborers have gone out to work, which has become the main means for migrant workers to maintain their livelihoods [1–3]. In 2018, the total number of off-farm workers in China reached 288.36 million, among them, 172.66 million left their hometown, accounting for 59.88% of the total [4]. Accompanied by this phenomenon, rural female laborers' outward transfer has become the norm. The traditional gender division of the labor system is characterized by the family model of "male outside, female inside", but this pattern is gradually changing. With the deepening of non-agriculturalization, the proportion of female migrant workers has been increasing. In the last three decades, the proportion of female migrant laborers has increased from about 25 to 37% [5], "Breadwinning men and homemaking women" and "farming men and weaving women", the traditional social patterns of the gender division of labor, have begun to change, and women's social roles have shifted from the single role of family to the dual roles of career and family [6]. On the

other side, various problems, such as left-behind children and elderly people, are constantly emerging. Regarding this issue, scholars believe that women can play a good balancing role [7,8]. Rural women are not only important members as generators of household income, but also major participants in household decision-making. The rural female workforce plays a pivotal role in the upbringing of children and support of the elderly. From this perspective, analyzing the household effects of rural female labor migration, including both positive and negative impacts, and proposing countermeasures and solutions are of great significance to the orderly transfer and rational movement of households and rural labor.

The concept of "rural female" or "rural women" is generally understood to have three dimensions: firstly, the occupational dimension, which refers to women working in agriculture; secondly, the residential dimension, which refers to women living in rural areas; and thirdly, the social identity dimension, which refers to women with rural household status, regardless of their occupation or place of residence [9]. The rural female labor mentioned in this study mainly refers to the female labor force with rural household registration aged 16–64, have the ability to work and produce, and can engage in certain social production and convert it into remuneration.

The employment transfer of rural labor force refers to the one-way transfer of the rural labor force from agriculture to non-agricultural industries, from local to other places or from rural to urban areas. We can analyze the employment rural labor force transfer from three aspects: appearance, nature and causes [10]. The transfer of rural labor force involved in this paper includes two meanings: industrial transfer and geographical transfer.

In terms of labor migration theories, Western research was carried out earlier, forming a systematic theory and model of population migration, such as the earliest "push-pull theory" and its quantitative model. Since then, researchers have conducted a series of theories and models, such as the migration theory of new economics, the dual labor market theory and the Todaro model. Western research on women's migration has gradually shifted from focusing on the socio-economic motivation of women's migration to the study of the relationship between women's migration and their family status and social structure [11], and feminist theory then entered the study of migration and employment, forming a new discourse system and analytical framework, e.g., gender theory (gender theory holds that because of the social perception of women's roles, as a result, most women are employed in the informal sector, leading to inequality between men and women in the family and society [12]). Under the guidance of Western theoretical framework, Chinese scholars have carried out a large number of studies on the issue of population migration. In order to understand the issue of female labor migration, relevant researchers consider the status of Chinese rural women in the family and society and believe that two approaches are worth considering: the first is behavioral analysis, and the second is family strategic analysis [13]. This paper will also try to explore the family effect of female employment transfer under the framework of gender theory.

2. Literature Review

Under the framework of relevant theories, the influencing factors of female migration has become a hot topic in population research. The influencing factors of migration are mainly divided into personal factors, economic factors, family factors, socio-economic and psychological factors, and lead to many enlightening conclusions [14].

The family and social effects of rural labor transfer are increasingly recognized as important, with these topics gradually becoming a research hotspot. To date, studies on the labor employment transfer effect have mainly focused on its economic influences, such as its contribution to national economic growth from a macroscopic perspective and its effects on the income level and income distribution of farmer households from a microscopic perspective. Moreover, scholars have studied the effects of rural labor employment transfer on poverty alleviation and income distribution. These studies have mainly focused on poor and underdeveloped regions in developing countries. The existing research has demonstrated significant effects of the rural labor force on poverty alleviation. Foster

and Rosenzweig [15] argued that labor participation in non-agricultural employment is a major cause of increased rural income. Dev and Ravi [16] reported that growth in non-agricultural employment is a key factor in facilitating poverty alleviation. Himanshu et al. [17,18] analyzed survey data and found that growth in non-agricultural employment in the rural labor force in India had a significantly higher contribution to poverty alleviation than agricultural development. Most existing studies have demonstrated that, to a large extent, rapid economic development depends on the resource reallocation brought by long-term rural labor transfer [19,20]. For families in poor regions, rural labor participation in non-agricultural employment is conducive to poverty alleviation and can contribute to more equal income distribution, since the agricultural benefits are relatively low [21].

Many studies have found that remuneration due to labor transfer facilitates family economic development [22,23]. Evidence indicates that with social progress and development, labor transfer deepens, and rural labor income may increase accordingly. Furthermore, in a study of Shaanxi Province, it was found that the length of time spent migrating to work and the number of labor force both had a significant positive impact on the income of farmers [24].

Many previous studies have also found that employment transfer of rural females can not only help these women achieve higher incomes and improve their positions in their families and society [25], but also be conducive to obtaining new knowledge and new life experiences to achieve better individual development. Moreover, labor transfer of rural females is beneficial to the stability and balance of the rural labor structure [26] and can also improve the relationships between spouses [27]. However, many studies have also found that the child-bearing willingness of females who have undergone rural employment transfer is significantly decreased [4,18,28]. Furthermore, some studies have reported that rural female employment transfer has some negative effects on the physical and psychological health of the left-behind elderly, as well as on the health and education of left-behind children [29]. For example, increasing time in non-agricultural employment among females has been found to have significant negative effects on the health of their children [30]. Welfare effect refers to changes in the social welfare situation (positive or negative) brought about by social and economic activities. In this paper, the changes brought upon the family welfare situation are generally called the family welfare effect.

Previous studies examining the effect of labor transfer have mainly been based on static cross-sectional data; very few studies have utilized dynamic panel data. Furthermore, at present, studies of the rural labor transfer effect have mainly examined the overall effect of labor transfer forces; few studies have examined the effect of female rural transferal. Additionally, existing studies have mainly focused on improvement in employment income and livelihood. There is a lack of comprehensive quantitative measurements and analyses of the mechanism underlying the effects of female employment transfer on individuals and their families. Such analyses may have significant implications for policy development. Thus, this study aims to address this shortcoming in the literature.

3. Data and Methods

3.1. Research Area and Data Sources

The Sichuan province, a typical agricultural province in Western China, was chosen as the study area. Since there are considerable differences in economic and social development between districts and counties in Sichuan Province, as well as within counties, sample selection was performed using a strict scientific method with consideration to the typical and atypical properties of regions. The data for this study were obtained from the peasant household sampling tracking surveys performed by the China Rural Development Survey Group, Institute of Geography, Chinese Academy of Sciences and the research team in 2013, 2016 and 2019. For the whole of Sichuan Province, the sampling method was as follows. First, according to the research results of Rozelle [31], counties in Sichuan Province were ranked according to their per capita total industrial output value. Districts and counties in Sichuan Province were divided into five clusters from high to low per capita

total industrial output value. In each cluster, one sample area was chosen randomly. The spatial locations of the sample villages are shown in Figure 1. After the sample areas were selected, towns in the chosen sample areas were divided into a high-income group and low-income group according to the ranking of per capita total industrial output value. Then, one sample town was chosen from each group randomly, and two villages were chosen from each sample town. Among the 20 chosen villages, 20 peasant households in each village were chosen randomly using a register and table of random numbers; thus, a total of 400 peasant household samples were collected. As the study focused on the family effects of employment transfer for rural women, married women with families were selected. Through further cleaning and screening, the desired female samples were chosen. A total of 662 rural female samples were obtained. Among these, 591 rural female samples that could be fully matched were collected in 2013, 2016 and 2019 (197 in each year).

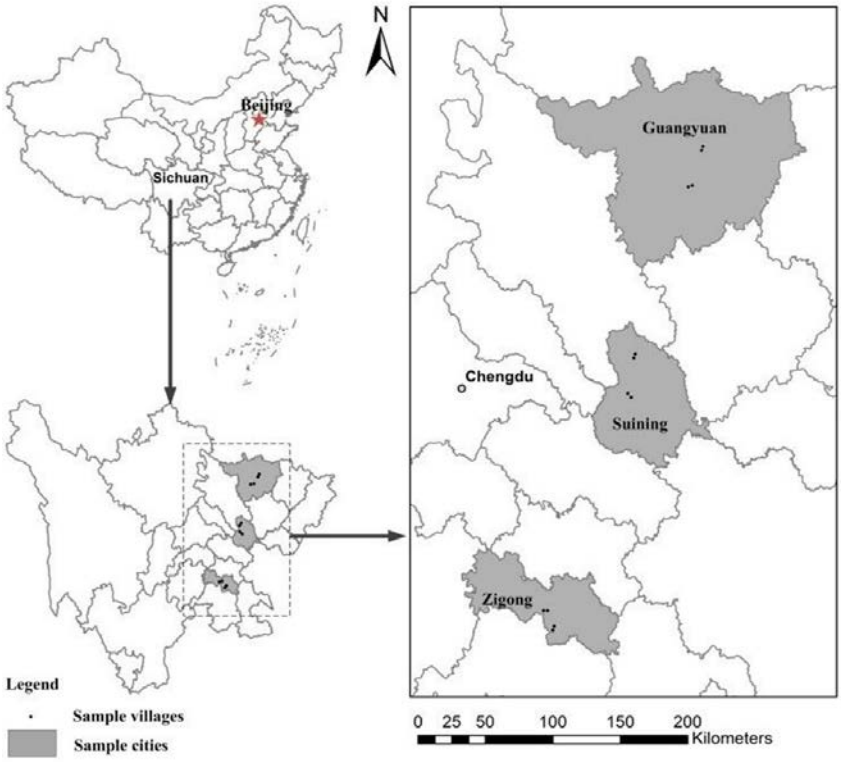

Figure 1. The spatial locations of the sample villages.

3.2. Variables

3.2.1. Dependent Variables

The family welfare effect of rural female employment transfer in mountainous regions was divided into two aspects: children (children in the household were considered to be the sons and daughters of rural females) and the elderly (elderly individuals in the household were considered to be aged 65+ years). The indicator variables for children included education level (education level measured by years of schooling) and number of children. The indicator variables for the elderly included health condition ("health level of the elderly" in this paper is the subjective evaluation of the elderly on their own health level, and its measurement standard is different. In classical psychology it is appropriate to use the Likert scale to measure it. The judgment sentence in this paper is "health level". Respectively, 1–5 means that the health level of the elderly is " very good, relatively good, good, relatively poor, poor". The higher the score, the worse the health level of the respondents) and number of elderly family members. All dependent variables' definitions and assignments can be seen in Table 1.

Table 1. Variable settings.

Classification	Variables	Abbreviation	Assignment	Variable Type
Dependent variables	Children's education degree	CEDU	(Year)	Continuous variable
	Number of children	CNUM	(Number)	Continuous variable
	Number of elderly people	ONUM	(Number)	Continuous variable
	Health status of elderly:	HEA	1 = very good, 2 = better, 3 = fair, 4 = poor, 5 = very poor	Continuous variable
Independent variables	Whether working outside the home	WWO	yes = 1, no= 2	Dichotomous variable
	Employment location	LOC	1 = work in the county, 2 = OCP = work in other counties of the province, 3 = OTP = work in other provinces	Category variable
	Employment industry	JOB	0 = unemployment/staying at home, 1 = AGR = agriculture, 2 = SEI = secondary industry, 3 = TI1 = tertiary industry I, 4 = TI2 = tertiary industry II	Category variable
	Rural females' education degree	EDU	(Years)	Continuous variable
	Age of rural women laborers	AGE	(Years old)	Continuous variable
	Whether being village cadres or not	WVC	yes = 1, no = 0	Dichotomous variable
	Urbanization rate of the district and county	URB	percent	Continuous variable

3.2.2. Independent Variables

Consistent with current research [32–34], a family welfare effect model of rural women's employment transfer was constructed (Figure 2). In the questionnaires, rural female individuals and their employment characteristics included: education background (education level measured by years of schooling), age, employment industry (the employment industries of rural females were categorized as follows: "housewife/unemployed", "agriculture", "secondary industry", "tertiary industry I", "tertiary industry II" (Among them, the employment industries are mainly divided according to the industrial structures and the physical strength of the labor force: 1. agriculture, including farming, husbandry and cultivation; 2. secondary industry, including construction, mining and craftsmanship, manufacturing, water and electricity supply; 3. tertiary industry I, referring to the service industry, including transportation, life service industry (housekeeping, security, etc.), catering industry, etc.; 4. tertiary industry II, including various professional and technical industries such as commerce and trade, enterprises and institutions, teachers and doctors, as well as government departments and institutions at all levels), employment location ("in local county", "other counties in the province", "other provinces"), and migrant worker or not, while the social environmental variables included the urbanization rate [2,3,6]. All independent variables' definitions and assignments can be seen in Table 1.

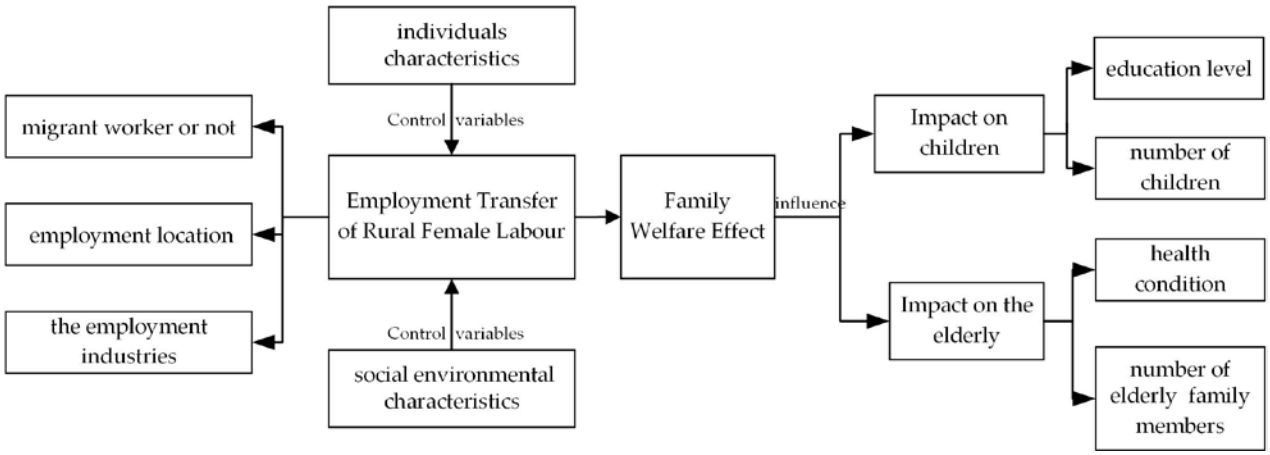

Figure 2. Family welfare effect model of rural women's employment transfer.

3.3. Model Methods

The three panel models were defined: a constant coefficient model without individual influences, an intercept-varying model, and a coefficient-varying model. The forms of these three models were as follows:

$$y_{it} = \alpha + x_{it}\beta + \mu_{it}, i = 1,\ 2,\ \ldots, N;\ j = 1,\ 2, \cdots T\ (\alpha_i = \alpha_j = \alpha,\ \ \beta_i = \beta_j = \beta) \quad (1)$$

$$y_{it} = \alpha_i + x_{it}\beta + \mu_{it}, i = 1,\ 2, \cdots N;\ j = 1,\ 2, \cdots T\ (\alpha_i \neq \alpha_j,\ \beta_i = \beta_j = \beta) \quad (2)$$

$$y_{it} = \alpha_i + x_{it}\beta_i + \mu_{it}, i = 1,\ 2, \cdots N;\ j = 1,\ 2, \cdots T\ (\alpha_i \neq \alpha_j,\ \beta_i \neq \beta_j) \quad (3)$$

Given that the parameters do not change over time, the following two hypotheses for the intercept and slope were developed:

$$H_1 : \beta_1 = \beta_2 = \ldots = \beta_N$$

$$H_2 : \alpha_1 = \alpha_2 = \ldots = \alpha_N, \beta_1 = \beta_2 = \ldots = \beta_N$$

When H_2 is accepted, a mixed effect model shall be constructed; that is, Model (1) is chosen. When H_2 is denied and H_1 is accepted, the individual fixed effect model is constructed; that is, Model (2) is chosen. When H_2 and H_1 are rejected, the coefficient-varying model shall be constructed; that is, Model (3) is chosen.

If number of children and the elderly in the family is 0, there is no data on children's education and the elderly's health condition. In addition, this study adopts the panel Tobit model (the Tobit model is also known as the sample selection model, restricted dependent variable model, and censor model) to re-estimate the trunking distribution of the restricted dependent variable, so as to make it conform to the actual distribution, and then analyze the effect of the transferring of rural females on children's education and the elderly's health condition [35]. The panel Tobit model cannot be used for fixed effect estimation (Model (2)) in Stata 16.

4. Econometric Results

4.1. Lagrange Multiplier and Hausman Test Results

The F-test, Lagrange Multiplier (LM) test and Hausman test were applied to judge which panel data regression model was more applicable to the data in this study. The fixed effect test (F-test) is mainly used to test whether individual differences in the intercept are significant. If the null hypothesis is rejected, there is a significant individual difference in the intercept, and the fixed effect has to be considered in the model. If the null hypothesis is accepted, the mixed OLS model is more appropriate. LM statistics can be used to test the

random effect. Under the null hypothesis, there is a Chi-square distribution with one degree of freedom (DOF). If the null hypothesis is rejected, there is a random effect. Finally, the statistic of the Hausman test is used to test the existing non-zero significance, thus enabling determination of whether there is an individual fixed effect in the panel data model, and thus, whether the fixed effect model or the random effect model should be chosen.

Because the panel Tobit model cannot be used for fixed effect estimation in Stata 16.0, Tobit models can also be divided into two categories: one is the mixed panel Tobit model, and the other is the random effects Tobit model. In the modeling process, we first constructed the random effects panel Tobit model, and then conducted the LR test. If the null hypothesis is not rejected, the final determination is the mixed panel Tobit model. If the null hypothesis is rejected, the random effects panel Tobit is constructed.

The child number model and elderly number model passed the F test, and fixed effects needed to be considered. The results of the LM test had a probability of 0.00, and thus, the null hypothesis was rejected; that is, there was a significant random effect. This suggests that the "random effect model" should be chosen rather than the mixed regression model. Furthermore, the probability of the Hausman test was 0.005 and 0.719. The child number model rejected the null hypothesis; accordingly, between the "fixed effect" and the "random effect" models, the child number model should adopt the "fixed effect model", and the elderly number model should adopt the "random effect model". The results of the LR test had a probability of 0.000, the child education and elderly health models rejected the null hypothesis, and the random effects panel Tobit was constructed (detailed results are listed in Table 2).

Table 2. LM and Hausman test results.

Test	Child Education Model	Child Number Model	Elderly Number Model	Elderly Health Model
LM/LR test	74.41 ***	344.21 ***	29.88 ***	14.28 ***
	(0.000)	(0.000)	(0.000)	(0.000)
Hausman test	/	25.18 ***	7.06	/
	/	(0.005)	(0.719)	/
N	514	574	574	294

Note: *** $p < 0.01$. Stata 16.0 software (Lakeway Dr, College Station, TX, USA) was used to analyze the data.

4.2. Descriptive Statistical Analysis

From 2013 to 2019, age, the urbanization rate and the number of elderly individuals changed significantly, with all exhibiting rising trends (Figures 3–5). The data in 2019 (Table 3) revealed that the education background of children was the highest in this year, with a mean of 10.20. However, the mean education degree of rural females in mountainous regions was only about 4.3 in 2013. This reflects that with increasing age, the education background of children in rural areas improves. This suggests that the education of children has attracted increasing attention over time, although the old generation of rural females have a low educational background themselves. In this study, the rural female respondents were aged from 30 to 64 years, with a mean age of 55.78 years. The average number of children was 1.24; most families had one to two children, four children at most. The average number of elderly people in the household was 0.82 and more than 48% of families had no elderly family member over 65 years of age. The mean health condition of the elderly was 3.34, indicating an overall poor health condition in the elderly. Most old people felt that they had moderate or relatively poor physical health.

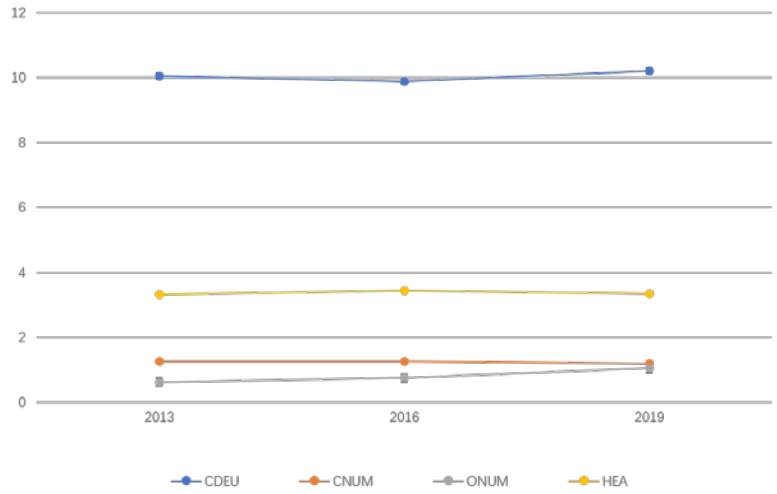

Figure 3. Three-year changes in dependent variables.

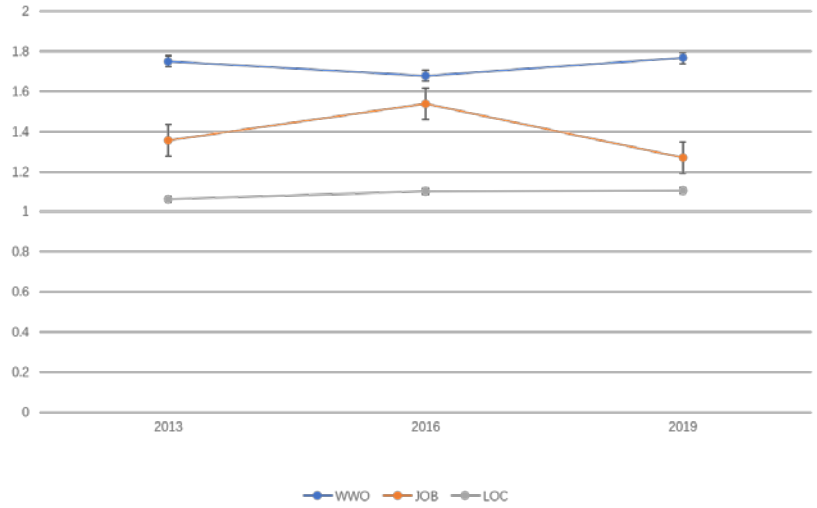

Figure 4. Three-year changes in employment transfer characteristics.

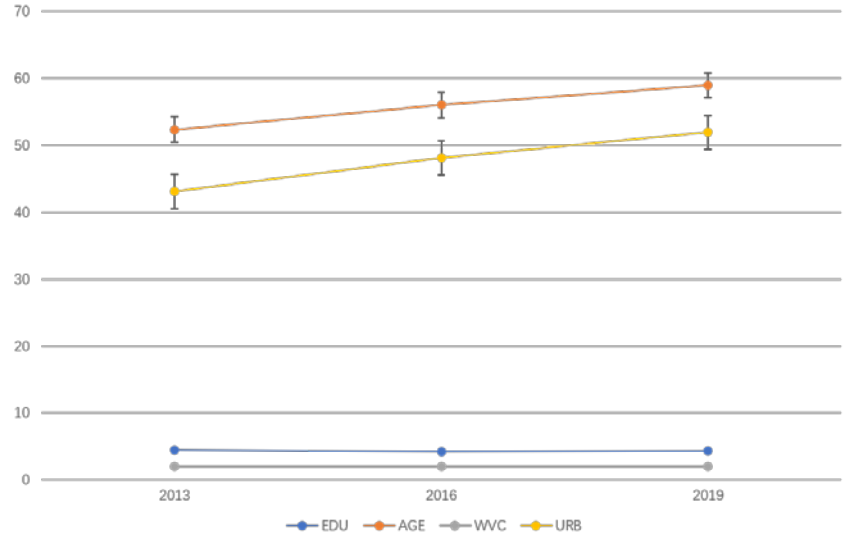

Figure 5. Three-year changes in individual and social characteristics.

Table 3. Descriptive statistical results of panel data.

Variable	2013		2016		2019	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Dependent Variables						
CEDU	10.05	3.64	9.88	3.12	10.20	3.19
CNUM	1.26	0.70	1.26	0.65	1.20	0.67
ONUM	0.63	0.77	0.76	0.90	1.06	0.98
HEA	3.33	0.57	3.44	0.72	3.34	0.74
Independent Variables						
Employment transfer characteristics						
WWO	1.75	0.43	1.68	0.47	1.77	0.42
LOC	1.06	0.31	1.10	0.42	1.11	0.43
JOB	1.36	0.85	1.54	1.19	1.27	0.98
Individual characteristics						
EDU	4.40	3.57	4.19	3.62	4.30	3.57
AGE	52.36	9.07	56.01	9.07	58.98	8.94
WVC	1.98	0.12	1.98	0.12	1.98	0.12
Social characteristics						
URB	43.11	14.6	48.14	13.84	51.93	13.83

With respect to employment, from 2013 to 2019, in terms of whether to go out or not, the average value dropped from 1.75 to 1.68 and then returned to 1.77, and more than 70% of rural women in mountainous areas did not choose to go out for employment; the average value of employment industry changed from 1.36 to 1.27, after the rise in 2016, more rural women returned to work in agriculture; the average place of employment continues to rise, which means that more and more women are working in agriculture or other industries outside their own villages, but the majority of rural women (95%) still choose to work in their own counties (Figure 4).

4.3. Regression Results of Panel Data Models

4.3.1. Regression Results of Children's Education Level and Number of Children

The effects of female employment transfer in mountainous areas on the children in the family are shown in Table 4. Model 1 and Model 3 show the panel regression model results of the effects of employment transfer variables on the children in rural areas. Model 2 and Model 4 tested the robustness of the identified variables, which are the results after applying the control variables of individual and social characteristics based on Model 1 and Model 3. By comparing Model 1 and Model 3, and Model 2 and Model 4, we can see that the effects of all variables on the children in the family were relatively robust after dependent variables were included. Therefore, the results of Model 2 and Model 4 were used for the follow-up analysis.

According to the regression results of the child education model in Table 4, age, education degree of females, employment industry and employment location had significant influences on the education degree of the children of rural females, when all other variables were controlled. Specifically, age had a significant negative influence on the education degree of children. When the other variables were fixed, the education degree of children decreased by 8.7% for each unit increase in the age of rural females. The education degree of rural females had an obvious positive effect on the education degree of children. The education degree of children increased by 23.3% for each unit increase in the education degree of rural females. Employment in agriculture, secondary industry, third industry I and third industry II had negative effects on the education degree of children, with coefficients of −161, −2.87, −2.27 and −1.66, respectively. The education levels of children of rural females who were engaged in agriculture, secondary industry and tertiary industry were lower than those of children of rural housewives. Working in another province had a positive effect on the education degree of children. The education degree of children of

females who worked in other provinces was 1.77% higher than that of children of females who worked in local counties.

Table 4. Panel regression model of children's education level.

Variables		Child Education Model				Child Number Model			
		Model 1		Model 2		Model 3		Model 4	
		Coef.	St. Err.	Coef.	St. Err.	Coef.	St. Err.	Coef.	St. Err.
Employment transfer variables	WWO	−0.656	0.687	−0.153	0.676	−0.113	0.082	−0.127	0.081
	OCP [a]	−0.572	1.035	−0.584	1.009	0.08	0.126	0.099	0.124
	OTP [a]	1.674 *	0.894	1.772 **	0.857	0.002	0.119	0.045	0.118
	AGR [b]	−1.847 ***	0.561	−1.611 ***	0.551	−0.106 *	0.062	−0.144 **	0.062
	SEI [b]	−2.723 ***	0.998	−2.874 ***	0.981	−0.226 **	0.113	−0.306 ***	0.114
	TI1 [b]	−2.134 **	0.902	−2.267 **	0.888	−0.149	0.104	−0.177 *	0.104
	TI2 [b]	−1.347	0.951	−1.664 *	0.948	−0.235 **	0.109	−0.247 **	0.109
Individual and social variables	AGE			−0.087 ***	0.021			0.017*	0.009
	EDU			0.233 ***	0.053			−0.014	0.01
	WVC			0.634	1.223			−0.058	0.176
	URB			0.009	0.012			−0.022 ***	0.007
N		516		514		574		572	
R-squared		/		/		0.02		0.07	

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Stata16.0 software (Lakeway Dr, College Station, TX, USA) was used to analyze the data. [a] the reference group refers to people who were working in the county; [b] the reference group refers to people who were unemployed/staying at home.

According to the model regression results (Table 4), age, urbanization rate and employment industry had significant influences on the number of children. Specifically, age had a positive influence on the number of children, and this was significant at the 10% level. When the other variables were fixed, the number of children per family increased by 1.7% for each unit increase in the age of rural females. The urbanization rate had a significant negative effect on the number of children. The number of children per family decreased by 2.2% for each unit increase in the urbanization rate. Villages with higher urbanization rates had lower numbers of children per family. Employment in agriculture, secondary industry, third industry I and third industry II had negative effects on the number of children per family, with coefficients of −0.144, −0.306, −0.177 and −0.247, respectively. The number of children per family among females engaging in agriculture, secondary industry and tertiary industry was less than that of unemployed females.

Places with higher urbanization rates might have stricter controls on family planning, thus resulting in a small number of children per family. Statistics indicate that the urbanization rate and the gross rate of enrolment in universities have been increasing [36]. Many young people have entered cities from rural areas and no longer believe that more sons equal greater happiness. Instead, they tend to adopt the urban concept of fewer and better births.

4.3.2. Regression Results for the Number and Health Condition of Elderly People in the Family

The effects of female employment transfer in mountainous areas on the elderly in the family are shown in Table 5. Model 5 and Model 7 show the panel regression model results of the effects of employment transfer variables on the elderly people in rural areas. Model 6 and Model 8 tested the robustness of the identified variables, which are the results after applying the control variables of individual and social characteristics based on Model 5 and Model 7. By comparing Model 5 and Model 6, and Model 7 and Model 8, we can see that the effects of all variables on the elderly in the family were relatively robust after dependent variables were included. Therefore, the results of Model 6 and Model 8 were used for the follow-up analysis.

Table 5. Results of panel regression model on the number of elderly people.

Variables		Elderly Number Model				Elderly Health Model			
		Model 5		Model 6		Model 7		Model 8	
		Coef.	St. Err.	Coef.	St. Err.	Coef.	St. Err.	Coef.	St. Err.
Employment transfer variables	WWO	0.287 *	0.158	0.199	0.148	0.196	0.375	0.132	0.378
	OCP [a]	−0.149	0.241	−0.208	0.224	0.024	0.609	0.017	0.607
	OTP [a]	0.525 **	0.212	0.473 **	0.196	0.436	0.367	0.444	0.366
	AGR [b]	−0.197	0.121	−0.13	0.113	−0.265	0.217	−0.218	0.219
	SEI [b]	−0.2	0.222	0.03	0.208	0.158	0.506	0.296	0.51
	TI1 [b]	−0.139	0.205	0.001	0.192	−0.526	0.448	−0.418	0.45
	TI2 [b]	−0.079	0.216	0.019	0.205	−0.467	0.484	−0.392	0.496
Individual and social variables	AGE			0.041 ***	0.005			0.015 *	0.008
	EDU			0.023 *	0.012			0.014	0.023
	WVC			0.22	0.284			0.288	0.48
	URB			0.009 ***	0.003			−0.002	0.005
N		574		572		294		294	
R-squared		00.08		00.218		/		/	

Note: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. Stata16.0 software (Lakeway Dr, College Station, TX, USA) was used to analyze the data. [a] the reference group refers to people who were working in the county; [b] the reference group is ones who were unemployed/staying at home.

According to the regression results (Table 5), age, education degree of females, employment location and urbanization rate had a significant positive influence on the number of elderly in the family. As far as the employment transfer variable concerned in this study, working in another province had a positive effect on the number of elderly. The number of elderly of females who worked in other provinces was 47.3% higher than those who worked in local counties. Many scholars have also studied the impact of population migration on aging and have obtained significant results. At the same time, relevant scholars also predict that rural areas will face more drastic changes in the age structure of the population, the dependency ratio of the total rural population will rise substantially, and the degree and speed of aging are much higher than those of urban areas [37].

As for the individual and social variables, when the other variables were fixed, the number of elderly per family increased by 4.1% for each unit increase in the age of rural females. The education degree of rural females had an obvious positive effect on the amount of elderly. The number of elderly in the family increased by 23.3% for each unit increase in the education degree of rural females. When the other variables were fixed, the number of the elderly per family increased by 0.9% for each unit increase in the urbanization rate. This might be due to improved standards of living and better medical care in places with higher urbanization rates, thus resulting in a larger elderly population. Scholars have found that urbanization has significant influences on the aging of the population in rural areas, with a positive correlation between the two [38].

According to the model regression results (Table 5), only the age of rural females had a significant negative influence on the health condition of the elderly. The health condition of the elderly decreased by 1.5% for each unit increase in the age of rural females. It is not difficult to understand that the older women are, the older the elderly in their families are, and their health status becomes worse with age. Other concerned variables had no significant effect on the health of the elderly in this study, which may be due to the dual impact of labor migration on the health of the elderly found by some researchers. The relevant mechanism shall be investigated in the future.

5. Discussion

Previous studies have reported that employment transfer has negative effects on the number of children per family. When rural migrant workers live in cities, their thinking, actions, health concepts and education concepts can change to adapt to urban civilization.

Furthermore, the phenomenon of employment transfer can increase the overall quality of the population to some extent and has been shown to increase the age of first marriage among females, thus decreasing the fertility rate and the number of children per family [25]. Tang Guizhong [39] reported that the fertility rate of rural female migrant workers was far lower than that of rural females that stayed in their villages. There are two reasons for this: Firstly, employment transfer can increase the difficulties experienced in birth and in fostering children, thus influencing the number of children per family. Secondly, employment transfer causes changes in individuals' views and values [40,41].

Among the current research results, it is noteworthy that occupation and employment industry had dual influences on the education degree of children. The phenomenon of rural migrants working in cities had a two-way influence on left-behind children. On one hand, by working in cities, parents can improve their family's economic conditions, thereby increasing the affordability of education services for left-behind children [42–44]. The family income of migrant workers is far higher than the cost of living in their hometowns. Thus, the family's economic conditions are improved, and children have better learning conditions. On the other hand, when parents work in a city, left-behind children no longer have their parents as direct supervisors over their individual growth. Some children do not develop mature self-control and thus, may develop serious problems such as poor academic performance, defects in character, lack of family affection, etc. Consequently, many students may discontinue their education due to their poor study abilities and performance, thus missing the opportunity to obtain a normal education. The problems experienced by left-behind children due to rural labor transfer have become a key issue in rural development.

The aging population has influenced the level of economic development in regions and produces a certain social burden. Rural areas face many challenges associated with empty-nest elderly and left-behind elderly due to rural labor transfer in the younger generation. Hence, more attention should be paid to the issues associated with rural aging. There is a critical need to identify how to balance rural economic development, labor transfer and the problems associated with the aging population. Previous studies have found that with the increase of per capita welfare level, people pay more attention to health and education investment, and the quality of the population has been improved; not only has the average life expectancy increased, but the concept of fertility has also changed, and the number of children has decreased due to the increased cost of upbringing, which further promotes the development of aging, that is, the increase in the number of elderly in the population found in this study [45].

In terms of the relationship between female employment transfer and health levels of the elderly, which is also the focus of this study, only the age of rural females had a significant negative influence on the health conditions of the elderly. Nonetheless, elderly health condition remains a social concern with the continual aging of the rural population and improved living standards. How labor transfer influences elderly health condition remains controversial: related scholars have empirically analyzed the impact of gender-specific labor migration on the health of family members, concluding that male labor migration significantly improved the health of family members, while female labor migration significantly reduced the health of family members [46]. In addition to differences in research data and research methods, employment and transfer of children might influence the health conditions of their parents in different ways and on different levels, thus resulting in different research conclusions; the direction of influence is inconsistent. Without paying attention to the mechanism of different directions of influence, the controversial findings described above are likely to emerge [47,48]. Moreover, the health condition of the elderly might influence the employment transfer decision of children; if this endogenous association is ignored, the estimates obtained are likely to be biased. All these issues can be further explored in future studies.

6. Conclusions

This study utilized panel data from the peasant household survey in mountainous rural areas in Sichuan Province, China, in 2013, 2016 and 2019. The family welfare effects (impact on children and impact on the elderly) of rural female labor transfer for employment were investigated using the panel Tobit, fixed effect and random effect linear regression models. Some major conclusions were drawn.

(1) Age, education degree, employment industry and locations of rural females all had a significant impact on their children's education degree. Moreover, age had a negative impact on children's education degree, while education level of females had a positive impact. Rural females' employment in agriculture, the secondary industry, tertiary industry I and tertiary industry II had a negative effect on the education degree of children compared with being unemployed at home; compared with working in the county, working in other provinces had a very significant positive effect on the education degree of children.

(2) Age, urbanization rate and industry of rural females had a significant impact on their number of children. The urbanization rate had a negative effect on the children number per family, which was significant at the level of 1%, while age had a positive effect on children number per family, which increased with the age of rural women; rural females' employment in agriculture, secondary industry, tertiary industry I and tertiary industry II had negative effects on their number of children, with effect coefficients of -0.144, -0.306, -0.177 and -0.247, respectively.

(3) The effect of female employment transfer in mountainous areas on number of the elderly in the family was reflected as follows: age, education degree of females, employment location and urbanization rate had a significant positive influence on the number of elderly in the family. Only the age of rural females had a significant negative influence on the health condition of the elderly. Other employment transfer variables had no significant effect on the health status of the elderly.

According to the results of this study, in terms of rural policies, education access of the rural labor should be protected and improved. The government should aim to strengthen fundamental education in rural areas and offer more opportunities for vocational training. In addition, relevant public service agencies can be established to provide living care for children and elderly people left behind in rural areas, which can also reduce the pressure on rural families to take care of the family, thus solving the worries of rural migration workers. Furthermore, there is a need to broaden the employment channels for off-farm workers, increase rural household incomes and to develop projects suitable for the participation of rural women. Finally, it is necessary to popularize health knowledge and increase public health facilities in rural areas, especially among the elderly.

Author Contributions: J.Z. and S.L. designed the research; Y.Y. and Y.Z. collected the data; Y.S. analyzed the data and wrote the paper. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by National Natural Science Foundation of China (Grant No. 41571527); Research Fund for Philosophy and Social Sciences of Chengdu University of Technology (YJ2021-QN011).

Institutional Review Board Statement: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Statement: All participants in this study were provided with explanations via face-to-face interpretation as to the purpose and method of the investigation as well as possible risks and benefits of the study. Written informed consent was given prior to the investigation and the research did not contain medical records.

Data Availability Statement: The data that support the findings of this study are available from China Rural Development Survey Team, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of China Rural Development Survey Team. The data will not be shared because this is the confidential data of the China Rural Development Survey Team.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Zhang, H.X. Female Migration and Urban Labour Markets in Tianjin. *Dev. Chang.* **2010**, *30*, 21–41. [CrossRef]
2. Xie, F.T.; Xu, D.D.; Liu, S.Q.; Cao, M.T. The influence of gender and other characteristics on rural laborers' employment patterns in the mountainous and upland areas of Sichuan, China. *J. Mt. Sci.* **2015**, *12*, 769–782. [CrossRef]
3. Xu, D.; Guo, S.; Xie, F.; Liu, S.; Cao, S. The impact of rural laborer migration and household structure on household land use arrangements in mountainous areas of Sichuan Province, China. *Habitat Int.* **2017**, *70*, 72–80. [CrossRef]
4. Gaetano, A.M. Gender and Employment in Rural China. *Nat. Rev. Cancer* **2019**, *19*, 180–185.
5. Zhang, H.G. Viewpoint on Positional Change of Rural Female Today from the Change of the Cognition for Household Role. *Soc. Sci.* **2008**, *7*, 1.
6. Xie, F.T. *The Employment Transfer of Rural Female Laborers in the Mountainous and Upland Areas of Sichuan in the Urbanization Process*; University of Chinese Academy of Sciences: Beijing, China, 2015.
7. Camlin, C.S.; Snow, R.C.; Hosegood, V. Gendered Patterns of Migration in Rural South Africa. *Popul. Space Place* **2014**, *20*, 528–551. [CrossRef]
8. Xu, L. A Study on the Problems of Aging, Labor Migration and Rural Family Support—A Case Study of a Rural Multiple-child Family in Village B. North Jiangsu. *J. Shandong Agric. Eng. Coll.* **2015**, *1*, 1–3.
9. Li, Z. *Research on China's Rural Labor Transfer in the New Stage*; Northwest A&F University: Xianyang, China, 2005.
10. Chiu, Y.-F.; Sung, T.-Y. A Study on Employment Transfer Regulations of Migrant Workers. *NCTU Law Rev.* **2020**, 1–50.
11. Sandell, S.H. Women and the economics of family migration. *Rev. Econ. Stat.* **1977**, *59*, 406–414. [CrossRef]
12. Findley, S.E.; Williams, L. *Women Who Go and Women Who Stay: Reflections of Family Migration Processes in a Changing World*; International Labour Office: Geneva, Switzerland, 1991.
13. Eklund, L. *Gender Roles and Female Labour Migration—A Qualitative Field Study of Female Migrant Workers in Beijing*; Prop Report; Lund University: Lund, Sweden, 2000.
14. Sultana, H.; Fatima, A. Factors influencing migration of female workers: A case of Bangladesh. *IZA J. Dev. Migr.* **2017**, *7*, 4. [CrossRef]
15. Foster, A.D.; Rosenzweig, M.R. Agricultural Productivity Growth, Rural Economic Diversity, and Economic Reforms: India, 1970–2000. *Econ. Dev. Cult. Chang.* **2004**, *52*, 509–542. [CrossRef]
16. Dev, S.M.; Ravi, C. Poverty and inequality: All-India and states, 1983–2005. *Econ. Political Wkly.* **2007**, 509–521.
17. Himanshu; Lanjouw, P.F.; Murgai, R.; Stern, N. Non-Farm Diversification, Poverty, Economic Mobility and Income Inequality: A Case Study in Village India. *Soc. Sci. Electron. Publ.* **2013**, *44*, 461–473.
18. Fang, H.; Eggleston, K.; Rizzo, J.; Zeckhauser, R. Jobs and Kids: Female Employment and Fertility in China. *Sch. Artic.* **2013**, *2*, 12. [CrossRef]
19. Zeng, X. *Income Effects of Rural Labor Transfer Employment—An Empirical Analysis Based on Matching Estimator*; Hunan University of Science and Technology: Hunan, China, 2014.
20. Liu, X.; Tian, W. Analysis of the contribution of rural labor migration to economic grow in China. *Manag. World* **2005**, *5*, 91–95.
21. Li, S.; Zhao, R. Re-examination of income distribution of Chinese residents. *Econ. Res.* **1999**, 3–17.
22. Chen, W. An econometric analysis of rural surplus labor transfer and farmers' income increase. *J. Inn. Mong. Agric. Univ. Soc. Sci. Ed.* **2008**, *10*, 2.
23. Shi, H. An empirical study of the impact of outworking on the income of farming households: A survey and analysis of 1106 farming households in three counties of Ankang City, Shaanxi Province. *Acad. Forum* **2011**, *34*, 6.
24. Yao, Y. *Research on the Impact of Rural Labor Transfer on Household Production and Operation of Farmers*; Huazhong Agricultural University: Wuhan, China, 2015.
25. Zheng, Z.; Xie, Z. *Population Mobility and Rural Women's Development*; Social Science Literature Press: Beijing, China, 2004.
26. Su, Q.; Liu, H. An Empirical Study of Rural Female Labor Mobility. *Agric. Econ.* **2003**, 5.
27. Gaetano, A.M.; Jacka, T. *On the Move: Women and Rural-to-Urban Migration in Contemporary China*; Columbia University Press: New York, NY, USA, 2004.
28. Vobecká, J.; Piguet, V. Fertility, Natural Growth, and Migration in the Czech Republic: An Urban–Suburban–Rural Gradient Analysis of Long-Term Trends and Recent Reversals. *Int. J. Popul. Geogr.* **2012**, *18*, 225–240. [CrossRef]
29. Tao, R.; Zhou, M. New findings and policy implications based on empirical analysis of a survey in Anhui and Jiangxi provinces. *Manag. World* **2012**, 10.
30. Liu, J.; Dong, X. Maternal labour supply, child care and child health: Evidence from rural China. *World Econ. Dig.* **2011**, 17.

31. Scott, R. Stagnation Without Equity: Patterns of Growth and Inequality in China's Rural Economy. *China J.* **1996**, *35*, 63–92.
32. Xie, F.; Liu, S.Q.; Xu, D. Gender difference in time-use of off-farm employment in rural Sichuan, China. *J. Rural Stud.* **2019**, *93*, 487–495. [CrossRef]
33. Xu, D.; Xin, D.; Guo, S.; Liu, S. Sensitivity of Livelihood Strategy to Livelihood Capital: An Empirical Investigation Using Nationally Representative Survey Data from Rural China. *Soc. Indic. Res.* **2019**, *144*, 113–131. [CrossRef]
34. Shui, Y.; Xu, D.; Liu, Y.; Liu, S. The Influence of Human Capital and Social Capital on the Gendered Division of Labor in Peasant Family in Sichuan, China. *Soc. Indic. Res.* **2021**, *155*, 505–522. [CrossRef]
35. Yang, H.; Huang, K.; Deng, X.; Xu, D. Livelihood Capital and Land Transfer of Different Types of Farmers: Evidence from Panel Data in Sichuan Province, China. *Land* **2021**, *10*, 532. [CrossRef]
36. National Bureau of Statistics of China. *Migrant Workers Monitoring Report in 2016*; China Statistical Press: Beijing, China, 2018.
37. Gong, J.; Du, H.Y.; Wang, Z. Analysis of the Influences of Ecological Compensation Projects on Transfer Employment of Rural Labor from the Perspective of Capability. *Land* **2022**, *11*, 1464. [CrossRef]
38. Qiao, G.; Qiao, J.; Shao, L. Study on the spatial differentiation of the aging population and its changes in Henan Province. *J. Henan Univ. Nat. Sci. Ed.* **2016**, 522–530.
39. Tang, G. An analysis of the demographic value of the mobility of rural women of childbearing age in China. *Popul. Soc.* **1999**.
40. Lan, Z. The Educational Values of the New Generation of Migrant Workers and Their Impact on Their Children's Education. *J. Northeast Norm. Univ. (Philos. Soc. Sci. Ed.)* **2007**.
41. Luan, Y.; Zhang, G. An Analysis of the Lifestyle and Values of the New Generation of Migrant Workers in the Process of Citizenization: Based on a Sample Survey of the New Generation of Migrant Workers in Shenyang. *Agric. Econ.* **2010**, *8*. [CrossRef]
42. Khor, N.; Pencavel, J. Household Income Inequality, Income Mobility, and Labor Supply in China and the United States. 2006, *unpublished paper*.
43. Sharan, S.; Puttaraj, S. Women's Employment in Industry and It's Impact on Adoption of Family Welfare Measures. *Karnataka J. Agric. Sci.* **2010**, *15*, 343–348.
44. Foundation, J.R. The impact of employment changes on poverty in 2020. *A Da Capo Paperb.* **2012**, *31*.
45. Chu, G. Empirical analysis of the relationship between per capita welfare level, rural labor transfer and population aging. *Agric. Technol.* **2015**, *35*, 4.
46. Liu, X. Impact of rural labor mobility on the health of rural residents. *China Rural. Econ.* **2010**, *96*, 76–81.
47. Lian, Y.; Li, W.; Huang, B. Study on the impact of children's working outside the home on parents' health and life satisfaction. *Q. J. Econ.* **2014**, 18.
48. Liu, C. Parental health: Which is more important, money or time?—A re-examination of the impact of rural children working outside the home. *Manag. World* **2017**, *14*, 74–87.