

## Article

# Impact Assessment of Farmland Lease-Out on Rural Households' Livelihood Capital and Livelihood Strategy

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**Abstract:** Rapid urbanization and the gradual disappearance of urban and rural barriers have accelerated rural surplus labor migration. This study focused on the rural household's livelihood from the perspective of farmland lease-out. Using 382 rural households' data in Jiangxi Province, we used the seemingly unrelated regression and binary logistic models to analyze the impact of farmland lease-out on rural households' livelihood capital and livelihood strategy. The results indicated that farmland lease-out did not affect rural households' human capital but had a negative impact on social capital, natural capital and future life expectation, and had a positive impact on financial capital and physical capital. Farmland lease-out had a significant negative impact on agricultural pluriactivity-type livelihood strategies, while having a significant positive impact on off-farm employment livelihood strategies. In addition, the scale of farmland lease-out had a positive impact on the off-farm pluriactivity and off-farm employment livelihood strategies.

**Keywords:** farmland lease-out; livelihood capital; livelihood strategy



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## 1. Introduction

With the acceleration of industrialization and urbanization, China has witnessed the migration of a large amount of surplus rural labor to the cities as well as the increasingly serious phenomenon of the “hollowing out” of the countryside after reform and opening up [1–3]. From 1978 to 2019, the number of people employed in agriculture in Jiangxi Province decreased from 9.687 million to 7.008 million. The decrease rate reached 27.7%, with an average annual decrease of 63,700 people [4]. The trend of off-farm employment of rural labor is obvious. The reform of China's economic system has prompted the liberation of a large number of rural laborers through primary industrial production, and the development of the country's industry has attracted the migration of rural surplus laborers to off-farm employment. Due to the rapid development of regional economies and the acceleration of urbanization, it has become a mega trend for China's rural labor to move into off-farm sectors.

Under a series of land tenure reforms and policy advocacy, China's land lease market has gradually developed in recent years [5,6]. As a result, the ratio of leased land increased from about 5% in 2006 to about 35.1% in 2016 [5]. Jiangxi Province is a traditional agricultural area in China, which has a large amount of labor migration and a high degree of farmland fragmentation. A large number of the rural agricultural population migrate to secondary and tertiary industries or cities and towns, and the low utilization rate of farmland leads to land abandonment in many areas. Therefore, the trend is to improve the efficiency of agricultural management through farmland lease, which is an important condition to promote modernized agriculture. In recent years, the incidence of farmland management rights lease in Jiangxi province is about 40%, and the growth trend is slow. Most areas in Jiangxi province are densely populated and the per capita arable land is

small, which is not conducive to the development of large-scale agricultural management. Moreover, the speed of rural labor migration was much higher than that of farmland lease, and the farmland lease market was lagging comparatively, which led to the increasingly significant issue of marginal land utilization in recent years. The matching between farmland cultivation and labor input can effectively promote effective investment in human and material resources. Therefore, farmland lease is an important means to optimize and restructure farmland resources, especially cultivated land resources [7,8].

Due to the accelerated process of rural labor migration, rural households' livelihood strategies in China have undergone prominent changes in recent years. Economic liberalization and the transition to the market have become the basic principles of resource allocation. This market transition has led to the rapid growth of off-farm employment, and has also led to changes in Chinese rural households' livelihood strategies. These changes affect agricultural restructuring, structural employment shifts, large-scale farming and technological innovation [9,10]. During these processes, agricultural production exhibits diverse operation modes and functions, shifting from quantity orientation to quality and efficiency orientation. With the relevant agricultural and rural policies driving urbanization restructuring, rural households' livelihood strategies have undergone great changes.

While most Chinese rural households were still engaged in agricultural production, surplus rural labor was widely engaged in various off-farm sectors, including off-farm employment, self-employment and migrant labor. Though the contribution of agriculture to rural household income has declined, the share of labor employed in the agricultural sector remained at around 24% in 2020 [11]. Although small-scale farming still dominates agricultural production in China, rural households continue to seek off-farm livelihood strategies to increase and stabilize household income. The income structure of rural households in China has changed dramatically with the reform and opening-up process.

Reforming the rural land system and promoting rural land transfer is a guarantee for the rational use of land resources, which is conducive to developing modern agriculture and increasing the income of rural residents. Whether farmers respond positively to the land lease policy depends on whether the farmland lease policy could improve their living standards. An important reason for the low proportion of current land lease is that land was the base of rural households' livelihood. The study of land lease from the perspective of rural households' livelihoods can provide us with a new way to explore the impact of the land lease on rural households' livelihoods. How should farmers be guided to lease out their land and build sustainable livelihoods in an orderly manner? Therefore, based on the theory of sustainable livelihoods, this paper uses an empirical model to analyze the impact of land lease-out on livelihood capital and livelihood strategies and the impact of livelihood capital on the livelihood strategy choices.

Regarding the relevant literature, there is still no clear conclusion about how households change after the farmland lease-out. The farmland lease-out may have various impacts on rural households, but the impact on livelihood capital and livelihood strategies were the most direct and the most concerning aspect. In the context of labor migration and farmland lease, some farmers are bound to choose to lease their farmland out, and it is worthwhile to pay attention to how these farmland lease-out rural households can maintain sustainable livelihood development. The study of farmland lease from the perspective of farmers' livelihood can provide a new way of thinking for the study of farmland lease, which can better guide farmers to lease their land in an orderly manner and achieve sustainable livelihood development. Therefore, this study will focus on the impact of farmland lease on the sustainable livelihoods of rural households, observing the impact of farmland lease on the sustainable development of rural households from a new perspective.

The purpose of this paper is as follows: First, according to the concept of livelihood strategy transformation defined by several organizations, the research on rural livelihood strategy transformation focuses on the comprehensive activities and choices of rural households' livelihood strategies, especially changes in these activities and choices. Second, in order to distinguish the concept of livelihood strategies of rural households, the cur-

rent or previous types of livelihood strategies of each household can be determined by collecting and analyzing information on whether and when families change their decisions on farmland lease-out and off-farm employment. By analyzing the results of rural household livelihood strategy transformation, we can explore the coherent process of rural livelihood transformation.

The structure of this paper is as follows: The first part is the introduction, explaining the background of labor migration and farmland lease in China. The second part is the literature review and theoretical framework. Sorting out the pertinent literature on farmland lease-out and livelihood capital, it expounds the theoretical mechanism of farmland lease-out's impact on livelihood capital and livelihood strategies and puts forward research hypotheses. The third part introduces the data sources and variables selection and definitions used in this paper. The fourth part reports the model methods and empirical results of the impact of farmland lease-out on rural households' capital and strategy. The fifth part summarizes the conclusions and discusses the corresponding policy implications.

## 2. Literature Review and Theoretical Framework

### 2.1. Literature Review

International studies on farmers' livelihoods have mainly focused on rural poverty [12–14]. Many international scholars believe that diversification of livelihood strategies has become a major way for farmers to increase their economic income, and therefore they pay particular attention to the study of diversified farmers' livelihood strategies [15,16]. A large number of empirical studies have investigated the factors influencing farmers' livelihood strategies and diversification [17–19], which mainly include the characteristics of the household's head and farm households' asset endowment, external natural environment and socioeconomic factors. For example, Jansen et al. (2010) introduced the natural capital, regional capital and human capital variables into the model due to the lack of lagged livelihood capital variables in their study of farm household livelihood strategies in Honduras [20]. Nielsen et al. (2013) comparatively studied the influencing factors of farm household livelihood strategy choice in Mozambique, Nepal and Bolivia, the factors influencing the choice being the number of male and female laborers in the household, years of education of the household head, household savings, production equipment, live-stock stock, land ownership and ethnic relations [21]. Woldenhanna et al. (2001) concluded from an empirical analysis based on data from a study of farm households in Tigray that crude and backward agricultural production patterns and excessive idle labor severely constrain farmers' livelihood diversification [22]. Bhandari (2004) explained the impact of land endowment scarcity on household labor transfer decisions from the perspective of farmers' relative poverty perceptions, using a survey analysis of farm households in Nepal as an example, and found that farmers with scarce land endowments have a greater sense of relative poverty and a greater probability of making labor off-farm transfers [23].

In recent years, changes in rural livelihoods in China have attracted the interest of various research scholars, such as the quantification and valuation of livelihood assets [24], the impact of policy regimes on livelihoods [25,26] and the relationship between livelihoods and the environment [27]. With the gradual diversification of farmland lease forms, academics have conducted studies on the impact of farmland lease on households' livelihood capital. The relationship between people and land emerged as a complex issue, but farmland lease provides new ideas to solve the "people-land conflict" in the new era [28]. In-depth research on land use is of great practical significance for the livelihood strategy choices and the realization of rural revitalization strategy currently [29].

One view is that farmland lease-out promotes the livelihood capital of rural households [30]. China's farmland lease system can not only realize the large-scale management of agriculture but also bring certain security to rural households' livelihoods [31]. The current farmland lease policy expects to rationalize the allocation of land and labor resources in the market by exerting an institutional effect, which does not act directly on rural households but increases their income levels by changing the mechanism of labor

resource allocation. A prerequisite for the implementation of the farmland lease system is that it will improve the efficiency of resource allocation. From the perspective of micro empirical research, Zhao Lijuan et al. (2021) demonstrated that farmland lease has a positive contribution to the financial capital of rural households through CFPS data at the national level [32].

Another view points out that the farmland lease will increase rural household income as well as jeopardize their social security and health [33]. After farmland lease-out, the livelihood diversification of pluriactivity led to income gap widening among farmers [34]. For some pluriactivity-type households with higher incomes, their higher income usually derives from excessive working duration. Therefore, the farmland lease-out may have a negative impact on migrant workers' health level [35]. The farmland lease will also weaken the existing social network of rural households. Most of those leaving their hometowns are engaged in labor-intensive industries. Their confusion in the new environment and the interaction with strangers will weaken their social capital. The employment structure change will change the original social relations of the family, and also bring some impact on the original rural "acquaintance society" socializing mode. The original rural social capital is gradually undermined, whilst the remodeling of modern social relations needs a long period of time. Therefore, the promoting effect of social capital for rural household will become weaker.

Through the literature review above, it is seen that the current research on farmland lease and rural households' livelihood capital and livelihood strategies is abundant and relatively standardized regarding both theoretical basis and analytical methods. Since there are still some limitations and differences in the practice of farmland lease, the research intensity and directions of different scholars are also heterogeneous regarding the role of rural household types, lease-out modes, livelihood capital and labor migration. Since 2020, China has ushered in a new stage of relative poverty and rural revitalization development. Relatively deficient institutional structure and personal reasons lead to relative poverty. Livelihood strategies involve a combination of livelihood capital types. The more diversified the livelihood strategies, the more likely it is that the livelihood situation will improve. Farmland lease in general helps rural households to better allocate resources and improve production efficiency.

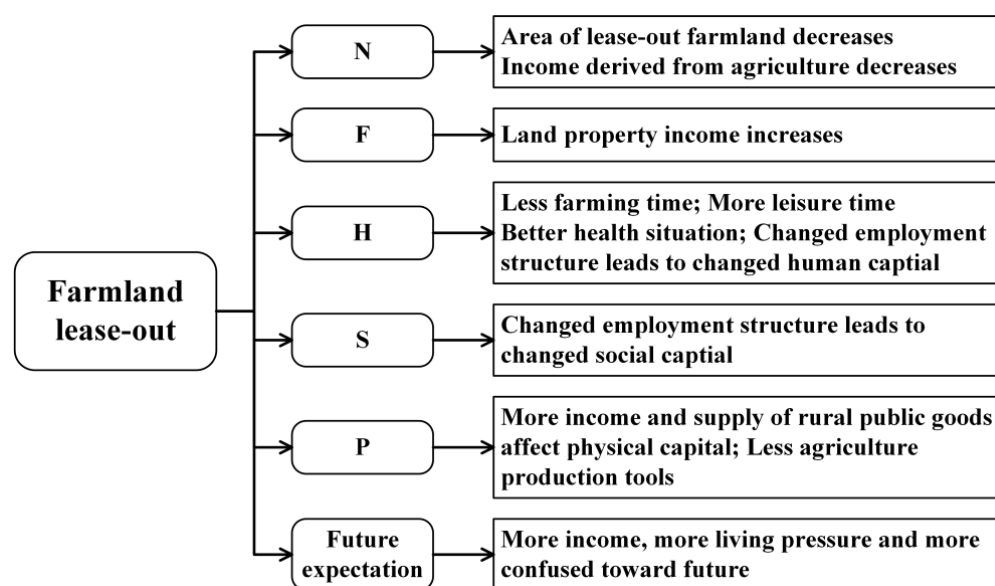
In terms of current research, there are rich results from the study of rural households' livelihood capital and livelihood strategies under the sustainability framework. At the macro level, there are relevant policies and systems implemented, such as policies on farmland improvement and rural tourism development. Geographically, there are analyses of livelihood strategies from the perspective of spatial aggregation and in ecologically fragile areas. However, there are fewer studies on land lease-out to vulnerable rural households. Nowadays, the composition of rural households is complex, there is great heterogeneity among households and the characteristics of rural households should be further classified before analyzing livelihood strategies. A few scholars have focused on analyzing specific rural groups such as returning migrant workers, or on farmland lease fees, which are worth studying. In future studies, we should continue to further classify the rural households before analyzing livelihood capital and livelihood strategies, which can better facilitate targeted policy recommendations for the sustainable development of rural households and have stronger practical significance.

## *2.2. Theoretical Analysis of the Relationship between Farmland Lease-Out and Farmers' Livelihood Capital*

Livelihood capital refers to the basic assets of communities and different types of households [36,37]. In addition to traditional assets such as financial capital (e.g., income, credit and current assets), natural capital (e.g., land, forest and water) and tangible capital (e.g., buildings and machines), family assets also include human capital (e.g., skills and knowledge of family members) and social capital (e.g., social networks and social relations, etc.). Rural households' livelihood capital was one of the important means to resist major

risks [38]. Land has always been the natural basis for the survival of rural households. The farmland lease-out will affect the existing resources and capital level of rural households. If the farmland of rural households is leased out, it will have various impacts on the original livelihood capital of rural households. First, the farmland lease-out will reduce the amount of cultivated land in households and reduce the natural capital level of rural households. Tools used in agricultural production and thus the physical capital will decline, but the supply of rural public goods will increase, which will jointly affect the changes of physical capital. The increase of circulation costs and the change of income structure after the farmland lease are relevant to the financial capital of rural households. After the farmland lease, the agricultural labor force in the original families will be liberated to a certain extent. The reduction of agricultural activities will bring great benefits to farmers. The increasing leisure hours may improve the health level of rural households. The change of employment structure will also change the human capital level of families. After the farmland lease, more and more family members participate in off-farm employment and leave their hometowns to engage in labor-intensive work, which will change the previous social relations and social networks of farmers' families, that is, the corresponding social capital will also change. Figure 1 shows the relationship between farmland lease-out and farmers' livelihood capitals. Therefore, the hypothesis is proposed as follows:

**Hypothesis (H1).** *Farmland lease-out has an impact on household livelihood capital.*



**Figure 1.** Theoretical framework diagram of the relationship between farmland lease-out and farmers' livelihood capitals.

### 2.3. Theoretical Analysis on the Change of Farmers' Family Livelihood Strategy

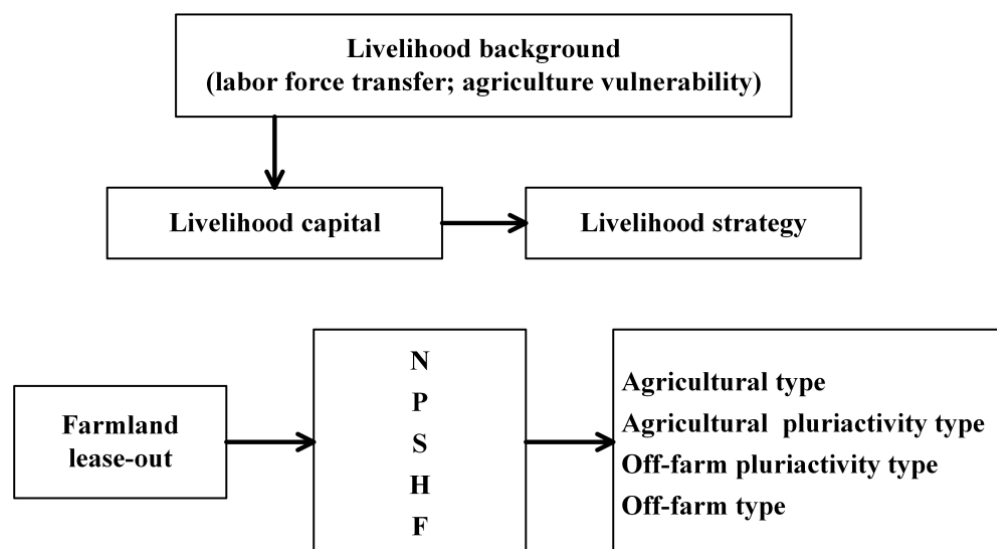
At first, livelihood strategy was simply defined as “a means of livelihood”, but over the years the academic understanding of it has developed into a dynamic and comprehensive conception, including all aspects of family welfare (e.g., material and non-material aspects). The main concepts used in each period are livelihood capital, livelihood strategy and livelihood outcomes. Farmers may fall into poverty at any time because they have little livelihood capital to generate income or they are limited in their ability to use the assets they have. However, some timely responding strategies to adapt to the external environment may bring new opportunities for families, that is, to accumulate new livelihood capital or break restrictions on the use of their original livelihood capital, so as to enable families to reduce their poverty temporarily or permanently [39,40].



The framework of this paper is innovative. It puts forward the research direction of land and livelihood strategies, and summarizes the links between these issues. In addition, it focuses on the impact and process of land use change on livelihood strategies, and emphasizes the diversity of interactions among various factors affecting rural households' livelihood strategies. The transformation of livelihood strategy takes place in a certain area in a specific period [41]. These changes are driven by socio-economic changes and technological innovations. The conception of livelihood strategy transformation can be further developed as follows: livelihood strategy transformation refers to the changes in a region's livelihood strategy driven by socio-economic changes and innovation in a specific period, which usually corresponds to the transformation of economic development stage [42,43].

This paper aims to explore the changes in livelihood strategies from the two perspectives of livelihood activities. The first perspective is off-farm employment. These activities refer to activities other than agriculture, such as farmers being employed as off-farm employment workers, working for township enterprises, operating private enterprises or working in commercial activities. The second perspective is income structure, which refers to the rural households' current income structure and level. The reason for choosing those is that in the past 30 years, labor has been the most active source of livelihood capital in China's rural livelihood transition [44,45]. Figure 2 shows the mechanism of household livelihood strategy transformation. Therefore, the second hypothesis is proposed as follows:

**Hypothesis (H2).** *Land lease-out will have an impact on farmers' livelihood strategies.*



**Figure 2.** Mechanism of household livelihood strategy transformation.

### 3. Data and Methods

#### 3.1. Data Source

Jiangxi Province is a traditional agricultural area in China, with a large labor output and a high degree of farmland fragmentation. In 2019, Jiangxi Province had an arable land area of 2,721,600 hectares, including 0.069 hectares of arable land per capita. The grain production of Jiangxi Province was ranked in the 13th place in the country in 2021, with a total output of 2192.3 tons. A large number of the rural population migrated to the off-farm sectors. From 1978 to 2019, the number in agricultural employment in Jiangxi Province decreased from 9.687 million to 7.008 million, with an average annual decrease of 63,700 [4]. With large-scale labor migration, China's urbanization process has also gradually accelerated.

Under the advocacy of a series of land ownership reforms and policies, China's land lease market has gradually developed in recent years [46]. In 2019, farmland lease in Jiangxi

was about 40% [4], and the growth trend is slow. The research data of this paper are derived from a stratified sampling survey of rural households in Jiangxi Province. Nanchang is geographically located in the central north of Jiangxi. By the end of 2021, Nanchang had a total area of 7195 km<sup>2</sup> and a resident population of 6,437,500. In 2019, Nanchang City made impressive achievements in economic and social development. The city's gross domestic product reached 559.618 billion yuan, per capita GDP reached 100,415 yuan, per capita disposable income of urban residents reached 44,136 yuan, and per capita disposable income of rural residents reached 19,498 yuan. The total output value of agriculture, forestry, animal husbandry and fishery in the city reached 36.053 billion yuan, and the output value of agriculture, fishery and animal husbandry is the pillar industry of agriculture in Nanchang. The survey used stratified sampling and random sampling to select survey objects based on geographic location, economic development level, and number of poor households in each township. We conducted the data collection in 30 villages in 5 counties.

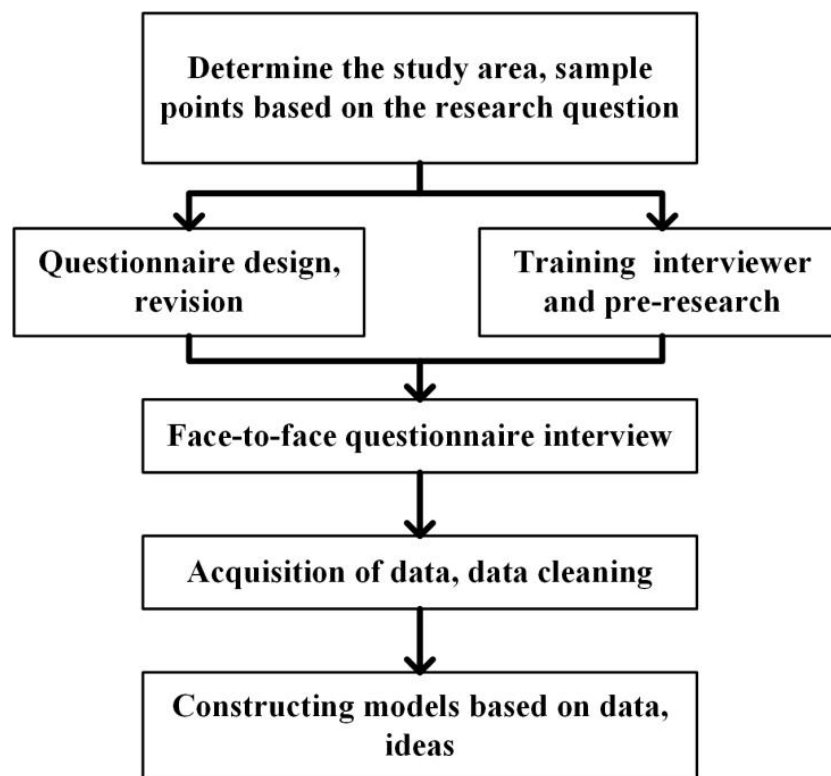
These five counties are Anyi County, Jinxian County, Nanchang County, Wanli District and Xinjian District. Among them, Nanchang County tops the five counties in terms of rural population, arable land area, agricultural output value and gross regional product. In 2019, Nanchang County had a rural population of 727,821, arable land area of 84,337 hectares, agricultural output value of 489,936,000 yuan and gross regional product of 8,116,340,000 yuan. The labor resources of Jinxian County are more abundant, reaching 470,962 people, ranking first. The highest disposable income from agricultural production of rural residents was in Xinjian District, reaching 3287 yuan per person. Meanwhile, the lowest rank should belong to Wanli District. The rural population, total labor resources and arable land area of Wanli District were 40,978, 26,440 and 3060 hectares, respectively, ranking last among the five counties. This also leads to its low agricultural output value, disposable income of rural residents from agricultural production and gross regional product, which were 191.57 million yuan, 93 yuan per person and 670.246 million yuan, respectively.

Then we randomly selected 15 rural households from each of the villages, totaling 450 interviewed rural households. We conducted the interview from the end of 2019 to the summer of 2020. The survey duration of each household was more than half an hour, and the questionnaire was divided into three main parts: basic household information, household assets and household livelihoods. The household assets section mainly included land resources and management, household social capital, household physical capital and household financial capital. The household livelihood section mainly included household production and household consumption. The whole process of data collection is shown in Figure 3. First, we determined the research area and sample points based on the research questions, then we designed the questionnaire and trained the researchers, then the researchers started the face-to-face questionnaire interviews, and finally we organized the obtained data and constructed the model based on the data. After removing some samples with missing information, a total of 382 valid samples were collected.

In terms of data collection, there are areas for improvement in this paper. During the field research, this paper only investigated the income and consumption of farmers' households in the current year, that is, the state of farmers' households in a certain period of time. The livelihood state of rural households is not constant, but dynamic, and will change at any time with socio-economic conditions, national policies and the conditions of their own livelihood capital. One of the shortcomings of this paper was carrying out a single time frame analysis, which cannot capture the situation as it changes with time. Therefore, further long-term follow-up investigation should be carried out in the future to make a long-term dynamic analysis of the livelihoods of rural households.

Table 1 shows the basic characteristics of the sample farmers, including age, years of education and whether they have mastered a particular technology. As can be seen from Table 1, the age of household heads is mainly concentrated in the two age groups of 36–50 years old and 65 years old or above, and there is a certain aging trend in the age of household heads. The proportion of household heads aged under 35 years old is the lowest, with only 23 households, accounting for 6.02%. Regarding the years of

education of household heads, the largest percentage was household heads with 6 years of education or less, which was 75.13%. Only 11 households had 12 years of education or more, which shows that the literacy level of household heads was generally low. Regarding the occupational skill mastery of household heads, 37 households had mastered a certain occupational skill, accounting for 20.16%; 79.84% of the household heads had not mastered the skill, accounting for the majority of the sample households in this study.



**Figure 3.** The process of data collection.

**Table 1.** Characteristics of heads of rural households.

Features	Feature Description	Frequency	Proportion (%)
Age	35 years old and below	23	6.02%
	36–50 years old	127	33.25%
	51–65 years old	87	22.77%
	Over 65 years old	145	37.96%
Years of education	6 years and below	287	75.13%
	6–12 years	84	21.99%
	12 years and above	11	2.88%
Whether had mastered a certain technology	Yes	37	20.16%
	No	345	79.84%

In particular, the lease-out time of surveyed household farmland was all before 2019, which was consistent with the survey duration of livelihood capitals. Therefore, time consistency in this research can better reflect the impact of farmland lease-out on livelihood capitals and livelihood strategies.

### 3.2. Variables Selection and Definition

#### 3.2.1. Dependent Variables

The explanatory variables in this article refer to the livelihood capitals and livelihood strategy. The detailed definitions and selection bases of livelihood capitals are shown

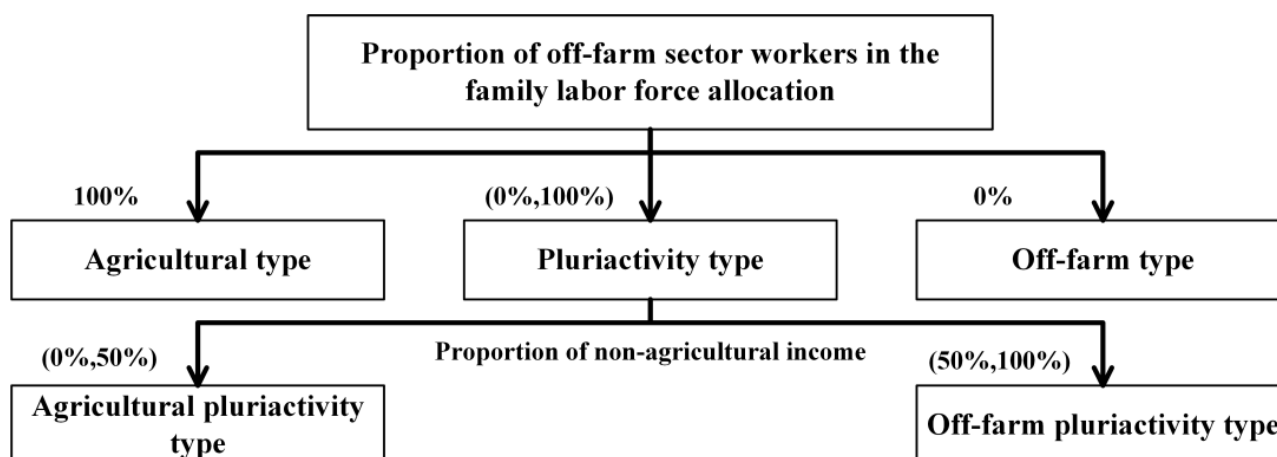


as follows: First is natural capital. For traditional Chinese farmers, agricultural land dependence was one of the most imperative traits of their lives. Farmlands can yield subsistence food and guarantee farmers' daily life. Farmers, especially older ones, will pay more attention to the natural capital of land. Therefore, per capita area of paddy field and per capita area of dry land are selected to represent natural capital. Second, the physical capital is closely related to the production and life of farmers, which determines their living conditions. Therefore, living equipment value, production equipment value and livestock value are selected here. Third, the financial capital is the capital basis for rural households to carry out plural activities. The richer the economic foundation, the more likely farmers will adopt plural livelihood strategies. So per capita cash income, the number of rural households they can turn to when they have a large capital demand and the availability of bank loans and non-profit organizations are selected to represent financial capital. Fourth, the human capital of rural households will affect whether they can enter fields with higher returns, so the number of the household adult labor force, the proportion of that labor force under 45 years old, the education level of the adult labor force, the health status of the family members and whether family members have received employment or entrepreneurship training are selected as representatives of human capital. Fifth is social capital. The social capital differences of rural households will also affect farmland lease-out, so the number of households where they can seek off-farm work, the number of urban relatives, the number of relatives serving as village/township cadres or civil servants and family communication fees are selected to represent social capital. Sixth, future expectations. During field investigations, it was found that farmers with different mentalities have great heterogeneity in making livelihood choices. On the basis of the DFID Sustainable Livelihood Analysis Framework, besides the five types of livelihood capital, household future expectation is also added as a sixth variable to depict the livelihood capitals situation. The measurement indicators and definitions of each type of capital are shown in Table 2. In order to make a more systematic and comprehensive evaluation of the farmers' livelihoods, this paper adopts the AHP-Entropy method to calculate the livelihood capitals.

The definition of the livelihood strategy was carried out as follows. Classifying livelihood strategies and investigating livelihood strategy shifts among farm households in a systematic and quantitative manner is important for understanding rural livelihood dynamics, livelihood strategy choices and for formulating effective rural development strategies. First, according to the proportion of off-farm employment in the household labor allocation, it is preliminarily divided into agricultural type, pluriactivity type and off-farm type. In detail, if the proportion of off-farm employment in the household labor allocation is 100%, then the household livelihood strategy is off-farm type. Conversely, if the proportion of off-farm labor is 0%, then the household livelihood strategy is agricultural type. If the proportion is between 0% and 100%, then the household belongs to a pluriactivity type. The next step of classification is to divide the pluriactivity-type household according to the proportion of off-farm income in the household income structure. If the proportion of off-farm income is less than 50%, the household is agricultural pluriactivity type. And if it is between 50% and 100%, the household belongs to off-farm pluriactivity type. According to the above-mentioned steps, the household numbers of agricultural type, agricultural pluriactivity type and off-farm pluriactivity type were 46, 110 and 66, respectively. However, the off-farm type accounted for the most, reaching 160 households. This is consistent with the actual situation in the survey area. The current livelihood strategies of farmers are diversified, and the phenomena of off-farm or pluriactivity are widespread. This shows that the selection and investigation of samples had a scientific basis. A flow chart showing the household livelihood strategy division is shown in Figure 4.

**Table 2.** Index system and definitions of household livelihood capitals.

Livelihood Capital	Aggregated Weights	Indicators	Definitions	Weights
Natural Capital (N)	0.18	Per capita area of paddy field	Total area of paddy field/total population of family (mu/person)	0.65
		Per capita area of dry land	Total area of dry land/total population of family (mu/person)	0.35
Physical capital (P)	0.12	Living equipment value	Total value of household living equipment such as tv, refrigerator, washing machine, air conditioner and electric vehicle (yuan)	0.53
		Production equipment value	Total value of tractor, tiller, harvester, agricultural tricycle and other agricultural machinery and equipment (yuan)	0.34
		Livestock value	Total value of livestock and poultry raised (yuan)	0.13
Financial Capital (P)	0.14	Per capita cash income	Household per capita income in 2019 (yuan)	0.67
		Number of rural households they can turn to when in large capital demand	Number of rural households they can turn to when in large capital demand (e.g., marriage, illness, operation, etc.) (household)	0.18
		The availability of bank loans and non-profit organizations	Whether able to receive bank loans or support from non-profit organizations (yes or no)	0.15
Human capital (H)	0.28	Number of the household adult labor force	Number of the household adult labor force (person)	0.13
		Proportion of labor force under 45 years old	Labor force under 45 years old/total household adult labor force (%)	0.18
		Education level of the adult labor force	Total number of the adult labor force with education level above junior middle school/total household adult labor force (%)	0.21
		Health status of the family members	Total number of the adult labor force with good or average health status/total household adult labor force (%)	0.31
		Whether family members have received employment or entrepreneurship training	Whether the family members have received employment or entrepreneurship training (yes or no)	0.17
Social capital (S)	0.15	Number of households where they can seek off-farm work	Number of households to which family members can turn for help when looking for off-farm jobs (household)	0.20
		Number of urban relatives	Number of relatives that households will contact in the city (person)	0.34
		Number of relatives serving as village/township cadres or civil servants	Number of relatives serving as village/township cadres or civil servants (person)	0.30
		Family communication fees	Expenses incurred for household communication equipment in the last month at time of the survey (yuan)	0.16
Future expectation (F)	0.13	Are you confident in your future life	Are the surveyed farmers confident about their future life (yes or no)	0.47
		Do you think living standards will improve in the future	Do the surveyed farmers think that their living standards will improve in the future (yes or no)	0.53



**Figure 4.** Types of household livelihood strategies.

### 3.2.2. Independent Variables

Farmland lease-in and lease-out are two approaches with completely different mechanisms regarding farmland transfer [47]. This study mainly analyzes the impact of farmland lease-out on farmers' livelihoods. Therefore, the core independent variables selected are whether to carry out farmland lease-out and the scale of farmland lease-out. Regarding the question of whether to carry out farmland lease-out, Yes is designated with 1 and No with 2. The controlled independent variables in this paper include household head, family and village characteristics. Farmers of different genders, ages, education levels and skills have different risk adaptation capabilities and different contributions to family income. Farmers' different sensitivity to environmental changes leads to different risk awareness of livelihood vulnerability. The health status of family members will affect the burden level of the family and further affect the livelihood capitals. Therefore, gender, age, education level, health status, political status and skill mastery are selected to represent the characteristics of the household head. The number the labor force of the rural household will also affect the choice of farmers' livelihood capitals [48]. Therefore, family size, family labor force ratio and family migration labor force ratio are selected to represent family characteristics. The village labor rate, village wealth degree and natural conditions will affect the employment choices, family income and social networks of rural laborers [49]. Therefore, village-level labor transfer ratio, village household average income and distance from town center are adopted to represent village characteristics. The specific definitions and related statistics are shown in Table 3.

**Table 3.** Variable definitions.

Variable Classification	Variable Name	Definition	Mean	Standard Deviation
Livelihood strategy	Agricultural type or not	Whether the household livelihood strategy is agricultural type: no = 0; yes = 1	0.12	0.213
	Agricultural pluriactivity type or not	Whether the household livelihood strategy is agricultural pluriactivity type: no = 0; yes = 1	0.29	0.296
	Off-farm pluriactivity type or not	Whether the household livelihood strategy is off-farm pluriactivity type: no = 0; yes = 1	0.42	0.497
	Off-farm type or not	Whether the household livelihood strategy is off-farm type: no = 0; yes = 1	0.17	0.245
Farmland lease-out	Whether to carry out farmland lease-out	Whether the household carried out farmland lease-out: no = 0; yes = 1	0.54	0.499
	The scale of farmland lease-out	The household lease-out farmland area: continuous variable	2.39	3.405

Table 3. Cont.

Variable Classification	Variable Name	Definition	Mean	Standard Deviation
Household head characteristics	Gender	Gender of the household head: male = 1; female = 2	1.18	0.381
	Age	Age of the household head: (year) continuous variable	53.07	15.038
	Education level	Years of education of the household head: (year) continuous variable	6.30	3.416
	Health status	Health status of the household head: healthy = 1; normal = 2; long-term chronic disease = 3; serious disease = 4; disability = 5	1.91	1.137
	Political status	Political status of the household head: formal or probationary CPC member = 1; non-CPC party member = 2; Non-partisan = 3	2.27	0.508
	Skill mastery	Whether the household head has mastered a certain skill (e.g., breeding, medicine, cooking, performance, etc.): yes = 1; no = 2	0.45	0.248
Family characteristics	Family labor force ratio	Number of the household adult labor force: (person) continuous variable	0.49	0.215
	Family migration labor force ratio	Number of family migration labor force/total number of household adult labor force	0.38	0.453
Village characteristics	Village-level labor transfer ratio	Village migration labor force/total labor force (%)	0.32	0.449
	Village household average income	Household average monthly income in the surveyed village (yuan)	5651	15.87
	Distance from town center	Distance from the village to the town center (km)	4.22	2.416

#### 4. Model and Empirical Analysis

##### 4.1. Model Methods

##### 4.1.1. Seemingly Unrelated Regression (SUR)

Based on the relevant descriptive analysis of the data, this paper uses survey data from 382 rural households to construct the influencing factor model of livelihood capital, and conduct a correlation regression analysis, focusing on the impact of farmland lease-out and its scale on rural households' various livelihood capital. Referring to the research on the influencing factors of livelihood capital by other papers [50,51], this paper uses the Seemingly Unrelated Regression (SUR) to jointly estimate equations of the influencing factor of each livelihood capital. In the influencing factor model of farmland lease-out on livelihood capital, the explained variables are six kinds of livelihood capital for rural households. Therefore, six equations need to be created to explore the influencing factors of the changes among livelihood capital. The specific form of the model is as follows:

$$y_i = \beta_0 + \beta_i X_0 + \varepsilon_i (i = 1, 2, \dots, n) \quad (1)$$

In the above Equation (1),  $y$  represents various capitals in farmers' livelihood capital, and  $X$  represents that the independent variables in the model including farmers' characteristics, family characteristics and village characteristics, and  $\varepsilon$  represents random disturbance terms.

##### 4.1.2. Binary Logistic Regression Model

Based on the impact of land use structure on the choices of rural households' livelihood strategy, the binary logistic regression model is used to analyze the impact of farmland lease-out on rural households' livelihood strategy. The explanatory variable in the model is the classification of rural households' livelihood strategies. In the model, when one of the livelihood strategies of rural households' is assigned as 1, the other three livelihood strategies are assigned as 0. For example, when analyzing the influencing factors of livelihood

strategy of agricultural pluriactivity type, the livelihood strategy of the agricultural pluriactivity type is assigned as 1, and strategies of the agricultural type, off-farm pluriactivity type and off-farm type are assigned as 0. The other three livelihood strategies are similar. The explanatory variables are whether rural households lease out rural land and the scale of rural land lease-out. The regression model is:

$$P(y = 1) = P(1 - P_Y) = \frac{\text{Exp}(\beta_0 + \beta_1 X_1 + \dots + \beta_i X_i)}{1 + \text{Exp}(\beta_0 + \beta_1 X_1 + \dots + \beta_i X_i)} \quad (2)$$

In the above Formula (2),  $X$  is the independent variable (farmland lease-out, rural households' characteristics, families' characteristics and village characteristics);  $\beta$  is the regression coefficient, which represents the change of dependent variable caused by the change of some independent variable;  $i$  represents the number of independent variables;  $P_Y$  indicates the probability of a certain livelihood strategy; and  $(1 - P_Y)$  indicates the probability of other livelihood strategies other than this livelihood strategy.

#### 4.2. Results for the Impact of Farmland Lease-Out on Rural Households' Livelihood Capital

This section uses the framework of the impact of farmland lease-out on rural households' livelihood capital as the theoretical basis, selects the quantified six types of livelihood capital as the dependent variable, and takes the farmland lease-out, the area of the farmland lease-out, and various variables such as rural household head characteristics, family characteristics, farmland characteristics and village characteristics as the independent variable to explore the impact of different factors on livelihood capital. The specific regression results are shown in Tables 4 and 5. Model 1 and Model 2 focus on the impact of farmland lease-out and of the scale of farmland lease-out on rural households' natural capital. In Model 1, farmland lease-out has a significant negative impact on the natural capital of rural households. Generally speaking, cultivated land (including paddy fields and dry land) accounts for the highest proportion of natural capital. After rural households transfer farmland out, the per capita scale of cultivated land is reduced, and their natural capital is thus weakened. In Model 2, the scale of farmland lease-out also has a significant negative impact on natural capital. The larger the scale of farmland lease-out, the lower the ownership of natural capital of rural households.

In Model 3, farmland lease-out has a significant positive impact on rural households' physical capital. The impact of farmland lease-out on rural households' physical capital is more complex. On the one hand, after farmers' lease-out of the land, most of the labor force in the family will choose to go out to work or to be employed near home, and the livelihood strategy mainly depends on off-farm employment. Therefore, it is bound to reduce the investment in agricultural machinery, livestock and other physical capital, so it has a negative impact on such physical capital to a certain extent. On the other hand, the total wage income and spare time of rural households will increase to a certain extent, and their horizons and lifestyles will also change. Therefore, a certain amount of investment will be added to the rural household living equipment. With the popularization of agricultural socialized services, the proportion of rural farmers purchasing agricultural machinery as a family unit for agricultural production gradually decreases. Therefore, agricultural machinery and livestock account for a relatively small proportion of physical capital. In future research, especially the research on rural land lease-out households, we should focus on the role of rural household living equipment as part of physical capital. In Model 4, the scale of farmland lease-out has no significant impact on rural households' physical capital.

In Model 5, rural land lease-out has a significant positive impact on rural households' financial capital. The possible reason is that after the farmland in the family is transferred out, on the one hand, farmers can get a fee for farmland lease-out. On the other hand, after the farmland is transferred out, farmers will choose to go out to work, which will increase the family's income from wage, management and property, and finally increase the average annual income of the rural households, so as to drive the improvement of financial capital. The scale of farmland lease-out has no significant impact on rural households' financial capital.

In Model 7, whether farmland is transferred out has no significant impact on rural households' human capital, which is somewhat inconsistent with Hypothesis 1. The possible reason is that most farmers choose to engage in off-farm work after transferring out their farmland. Most of the survey areas are located in villages very close to urban areas. It is very convenient for farmers to obtain off-farm employment opportunities, that is, many factors will affect the human capital of rural families. Affected by traditional ideas, rural households pay more attention to immediate interests and they are unwilling to spend human and material resources to receive relevant vocational skills training in order to improve their human capital level. Therefore, the impact of farmland lease-out on human capital in rural households is relatively weak. The improvement of human capital levels for rural families is a long-term and complex path. In Model 8, the scale of farmland lease-out has no significant impact on rural households' human capital.

**Table 4.** Regression results for factors influencing rural households' livelihood capital.

Variable Classification	Variable Name	N		P		F	
		Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Farmland lease-out	Whether to carry out farmland lease-out	−0.311 ** (0.147)	—	0.048 *** (0.019)	—	0.011 ** (0.007)	—
	The scale of farmland lease-out	—	−0.257 ** (0.146)	—	−0.444 (0.209)	—	0.255 (0.248)
Household head characteristics	Gender	0.089 (0.006)	0.087 (0.059)	0.013 (0.002)	0.115 (0.082)	−0.088 (0.015)	0.768 (0.157)
	Age	0.023 (0.001)	0.023 (0.169)	−0.285 * (0.132)	−0.274 * (0.133)	0.042 (0.043)	0.045 (0.439)
	Education level	0.051 (0.07)	0.057 (0.073)	0.089 ** (0.051)	0.093 ** (0.058)	0.045 ** (0.019)	0.059 ** (0.023)
	Health status	0.032 (0.010)	0.029 (0.017)	0.016 * (0.009)	0.023 * (0.014)	0.188 (0.287)	0.208 (0.287)
	Political status	0.064 (0.045)	0.078 (0.048)	0.059 (0.061)	−0.074 (0.061)	0.028 (0.011)	0.231 (0.011)
	Skill mastery	−0.060 (0.094)	0.064 (0.093)	0.154 * (0.012)	0.132 * (0.012)	0.035 ** (0.025)	0.054 ** (0.029)
Family characteristics	Family labor force ratio	−0.013 (0.002)	−0.013 (0.008)	0.011 ** (0.005)	0.009 ** (0.003)	0.025 * (0.021)	0.019 * (0.013)
	Family migration labor force ratio	−0.012 ** (0.084)	−0.011 ** (0.081)	0.019 * (0.005)	0.009 ** (0.003)	0.110 * (0.022)	0.099 * (0.027)
Village characteristics	Village-level labor transfer ratio	0.0334 (0.030)	0.202 (0.073)	0.047 * (0.025)	0.023 ** (0.013)	0.035 (0.525)	0.012 (0.278)
	Village household average income	0.5337 (0.044)	0.493 (0.021)	0.041 * (0.016)	0.032 * (0.013)	0.015 ** (0.011)	0.019 ** (0.014)
	Distance from town center	0.162 (0.083)	0.053 (0.039)	0.506 (0.414)	0.203 (0.078)	0.372 (0.114)	0.241 (0.114)
Constant		0.422 ** (0.134)	0.066 * (0.012)	0.478 * (0.242)	0.022 ** (0.011)	0.021 * (0.015)	0.208 ** (0.081)
Observation		382	382	382	382	382	382
R <sup>2</sup>		0.890	0.890	0.315	0.214	0.419	0.326

Note: \*, \*\*, \*\*\* are significant at the statistical levels of 10%, 5% and 1%, respectively.

Model 9 and Model 10 focus on the impact of farmland lease-out on social capital. According to Model 9, farmland lease-out has a significant negative impact on rural households' social capital. Social capital can be transformed into an important social resource for the development of family members. The social capital of rural households generally refers to social networks and social trust. After the farmland is transferred out, most of the labor force in the rural households will choose to go out to work, which will weaken the original



social network and kinship network of rural households. Most family members leave their hometowns to engage in labor-intensive industries. Confusion about the new environment and getting along with strange friends will weaken their social capital. Transformation in the employment structure will change the original social relationship of the family. With the popularization and development of communication technology and communication apps such as WeChat and TikTok in rural areas, there will be some impact on the “acquaintance society” communication mode in the original countryside. The original rural social capital gradually decreases, while the reconstruction of modern social relations takes a long time. Therefore, the role of social capital in promoting rural households’ families is weakening day by day. Therefore, the change and reconstruction of social capital of rural households is a problem worthy of considerable attention. The scale of farmland lease-out has no significant impact on rural households’ social capital.

**Table 5.** Regression results for factors influencing rural households’ livelihood capital.

Variable Classification	Variable Name	H		S		Future Expectation	
		Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
Farmland lease-out	Whether to carry out farmland lease-out	0.252 (0.646)	—	−0.112 ** (0.078)	—	−0.127 *** (0.045)	—
	The scale of farmland lease-out	—	0.347 (0.125)	—	0.464 (0.152)	—	0.211 (0.049)
Household head characteristics	Gender	0.336 (0.795)	0.223 (0.584)	0.187 ** (0.096)	0.202 (0.096)	0.060 ** (0.031)	0.065 ** (0.031)
	Age	—	—	0.389 * (0.269)	0.429 (0.212)	0.539 (0.874)	0.562 (0.882)
	Education level	—	—	0.592 (0.118)	0.705 (0.118)	0.611 ** (0.385)	0.284 * (0.138)
	Health status	—	—	0.223 * (0.176)	0.198 * (0.143)	0.142 * (0.057)	0.091 * (0.054)
	Political status	—	—	0.164 ** (0.071)	0.157 * (0.071)	0.025 (0.023)	0.027 (0.023)
	Skill mastery	—	—	0.145 (0.158)	0.169 (0.155)	0.711 ** (0.402)	0.648 ** (0.306)
Family characteristics	Family labor force ratio	—	—	0.124 (0.137)	0.209 (0.133)	0.016 * (0.004)	0.111 ** (0.043)
	Family migration labor force ratio	—	—	0.513 (0.134)	0.646 (0.173)	0.113 * (0.053)	0.148 ** (0.044)
Village characteristics	Village-level labor transfer ratio	0.031 * (0.015)	0.029 (0.017)	0.026 (0.009)	0.045 (0.016)	0.021 (0.029)	0.038 (0.032)
	Village household average income	0.331 * (0.136)	0.237 * (0.166)	0.423 (0.165)	0.260 (0.091)	0.331 * (0.184)	0.102 * (0.057)
	Distance from town center	0.171 ** (0.075)	0.336 ** (0.137)	0.366 (0.704)	0.757 (0.194)	0.228 (0.443)	0.661 (0.552)
Constant		0.512 ** (0.407)	0.568 * (0.452)	0.527 * (0.491)	0.531 ** (0.355)	0.370 ** (0.159)	0.396 ** (0.161)
Observation		382	382	382	382	382	382
R <sup>2</sup>		0.962	0.960	0.342	0.236	0.475 ***	0.260

Note: \*, \*\*, \*\*\* are significant at the statistical levels of 10%, 5% and 1%, respectively.

Models 11 and 12 focus on the impact of the farmland lease-out scale on rural households’ future life expectations. Model 11 shows that farmland lease-out has a negative impact on rural households’ future life expectations. The possible reason is that after households lease out the land, farmers change from a familiar hometown farmer into urban migrant workers, and the nature of work and self-identity will have changed greatly. Although the wage level will rise, the pressures of life and confusion about future life will

increase and they will also have to adapt to the new living environment and connections. Therefore, the expectation of future life may be negatively affected. In Model 12, the scale of farmland lease-out has no significant impact on rural households' expectations for the future.

In the characteristics of head of rural household, the age of head has a significant negative impact on the physical capital of rural households and a significant positive impact on social capital. The education level of the head has a significant positive impact on the physical capital, financial capital and the expectation of future life, indicating that the education level of the head can not only improve the human capital of rural households but also promote other livelihood capital. The health status of rural household heads has a significant positive impact on physical capital, social capital and expectations for the future. For the household head, being a CPC member has a significant positive impact on the level of social capital. The mastery of skills by the rural household head has a significant positive impact on physical capital, financial capital and future expectations. Because there is a strong correlation between the head of rural household characteristics, family characteristics and the level of human capital, the variables of head of rural household characteristics and family characteristics are not included in the regression analysis of human capital.

The proportion of family labor force in family characteristics has a positive impact on rural households' physical capital, financial capital and future life expectation, but has a negative impact on rural households' natural capital. The higher the proportion of labor force in the household, the more varied are the ways to obtain income, which will inevitably improve the overall income level of the household, so it will improve the physical capital and financial capital of the family. The higher the proportion of labor force in the family, the higher the wage level available in the future, which will improve the households' expectations for the future. In rural households with more population, generally speaking, the larger the cultivated land that can be contracted, and the richer the land resources. However, in the southern region where the per capita area is small and the land is fragmented, agricultural management income does not have a comparative advantage. Therefore, in the field study, the author found that most families with more labor force choose to go out to work and lease out the farmland one after another, which obviously reduces the natural capital of such rural households. The proportion of family migrant labor force has a significant negative impact on rural households' natural capital and a significant positive impact on physical capital and financial capital. The proportion of family migrant labor force has a significant negative effect on rural households' natural capital. Studies have proved that the proportion of family migrant labor force, that is, off-farm employment, will promote the lease-out of farmland [52]. The lease-out of farmland will lead to the reduction of rural households' natural capital. The increase of the labor force proportion of migrant workers will improve the wage income of rural households and promote expenditure on education and training, so it will promote the improvement of the level of rural households' financial capital. The labor force proportion of migrant workers significantly promotes the improvement of physical capital. The proportion of the labor working outside the home has significantly promoted the improvement of physical capital. The possible reason is that, influenced by traditional Chinese rural sentiments, after migrant workers obtain a certain wage income, most farmers will build houses on rural homesteads and increasingly pursue house quality and luxury decoration. The upsurge of rural housing construction in China also reflects the improvement of rural residents' physical capital level after farmers go out to work.

In the characteristics of the village, the transfer proportion of the village labor force has a significant positive impact on the physical capital and human capital of rural households. In the small-scale local society of the village, the migrant workers of the whole village have a certain driving effect on the migrant workers of a single family. The higher the proportion of labor transfer within a village, the more it will promote the proportion of migrant workers in a single family, and thus improve the physical capital and human capital level

of the whole family. The average income level of village rural households can significantly promote the physical capital, financial capital and human capital of rural households. The possible reason is that in the more developed areas, people will increase their investment in production tools, living equipment, education and medical treatment when their economic income is high, and thus improve the level of physical capital, financial capital and human capital of farmers in the whole village. The distance from village to town center has no significant impact on rural households' other kinds of capitals except for human capital. The distance from village to town center has a significant positive impact on the human capital of rural households. If the village is located in a suburban village with developed transportation, the rural land lease-out households will have more convenience in going out to work and more off-farm work opportunities to promote the reconstruction of human capital in the lease-out rural households. Therefore, the closer the village is to the town center, the higher the livelihood capital level of rural land transfer rural households.

#### 4.3. Results for the Impact of Farmland Lease-Out on Rural Households' Livelihood Strategies

In this section, the transformation mechanism of rural households' livelihood strategy is selected as the theoretical model, different categories of rural households' livelihood strategies are selected as the dependent variables (contained in the variable definitions table), such as whether the farmland is transferred out, the area of farmland transferred out, and the characteristics of rural household heads, families, farmland and villages are taken as the independent variables. The binary logistic model was used to explore the impact of different factors on rural households' livelihood strategies, with emphasis on farmland lease-out. The regression results are shown in Table 6.

**Table 6.** Binary logistic regression for rural households' livelihood strategy selection.

Variable Classification	Variable Name	Agricultural Type		Agricultural Pluriactivity Type		Off-Farm Pluriactivity Type		Off-Farm Type	
		Model 13	Model 14	Model 15	Model 16	Model 17	Model 18	Model 19	Model 20
Farmland lease-out	Whether to carry out farmland lease-out	−0.037 (1.330)	—	−0.223 * (0.124)	—	1.166 (0.238)	—	2.647 ** (1.545)	—
	The scale of farmland lease-out	—	−0.103 (0.210)	—	−0.039 (0.034)	—	0.150 ** (0.038)	—	1.073 * (0.596)
Village characteristics	Distance from town center	0.153 (0.099)	−0.664 (0.608)	0.207 (0.277)	0.054 (0.071)	0.102 * (0.077)	0.512 * (0.276)	1.644 ** (0.886)	1.257 ** (0.504)
Controlled variables		Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
Constant		2.540 * (1.234)	0.220 * (0.120)	1.032 * (0.595)	0.977 * (0.588)	−2.140 * (1.592)	−2.748 ** (1.264)	−2.305 ** (1.228)	−7.831 * (5.376)
Observation		382	382	382	382	382	382	382	382
Pseudo R <sup>2</sup>		0.266	0.277	0.267	0.367	0.130	0.115	0.311	0.315
Log Likelihood		−97.060	−95.565	−243.871	−243.834	−227.915	−231.784	−20.984	−20.844

Note: \*, \*\* are significant at the statistical levels of 10% and 5% respectively.

Model 15 shows that farmland lease-out has a significant negative impact on pluriactivity-type livelihood strategy. For rural households in less developed areas, agricultural income is still an economic source that cannot be ignored. After land lease-out, land rent and off-farm work income will become the main income sources of rural households. However, due to the heterogeneity of education level and professional skills of off-farm workers, the newly transformed off-farm family members are a group of rural low-income workers. This group is often accompanied by aging and low educational level, which is the most vulnerable group of livelihood capital in rural areas.

Model 18 shows that the scale of farmland lease-out has a significant positive impact on off-farm pluriactivity-type livelihood strategies. Model 19 and Model 20 show that farmland lease-out has the greatest impact on off-farm type livelihood strategies, with a positive impact at the significance level of 5%, and the scale of farmland lease-out also has a positive impact on the choice of off-farm type livelihood strategies at the significance level of 10%. The above empirical results show that land lease-out is one of the main factors influencing rural households to choose off-farm livelihood strategies. After leasing out of land, farmers must choose off-farm or off-farm pluriactivity-type livelihood strategies. Land lease-out has a great impact on rural households' livelihood strategy choices. The change of land use structure will also make rural households change their livelihood strategies [41]. Land resources are the most direct object of rural households' livelihood strategy selection. Rural development and rural households' income increases are inseparable from land. Land use is closely related to the rationality of rural households' livelihood strategies [42].

The research on rural households' livelihood strategies and rural households' livelihood strategy choices is the key issue for rural sustainable development, which is of great significance to optimize rural development policies and maintain social stability [41]. In the village characteristics, the distance from the town center has a significant positive impact on off-farm pluriactivity-type and off-farm type livelihood strategies. The distance from the township reflects the ability of farmers to approach the market. With the reduction of the distance between the village and the town center, the probability of rural households' livelihood diversification strategy increases significantly, and it is more convenient to engage in other off-farm pluriactivity livelihood strategies.

## 5. Discussion

This study aimed to address whether farmland lease-out affected rural households' livelihood capital and livelihood strategy. Based on the background of labor migration, we collected 382 rural households' data in Jiangxi Province, enabling us to take advantage of the seemingly unrelated regression and the binary logistic models in exploring the relationship between farmland lease-out and rural household livelihood. It was revealed that farmland lease-out did not affect the rural households' human capital, but had a negative impact on the social capital, natural capital and future life expectation, and had a positive impact on financial capital and physical capital. Farmland lease-out had a significant negative impact on agricultural pluriactivity-type livelihood strategies, while it had a significant positive impact on off-farm employment livelihood strategies.

The contributions of this study are primarily reflected in the following three dimensions: First, unlike most previous studies that were only focusing on livelihood capital or livelihood strategies [3,53], we examined different effects of lease-out on rural household livelihood including on livelihood capital and livelihood strategies. The results confirm both hypotheses and previous studies [54]. By taking into account the different enumerations of livelihood, we have also verified the robustness of our findings. Meanwhile, this paper analyzes the impact of farmland lease-out scale on livelihood capital and livelihood strategy. The difference in the scale of farmland lease-out will have a differentiated impact on family livelihoods. Compared with a single livelihood strategy or strategy combination [41,55], clustering methods and quantitative analysis take family capitals as the basis for determining rural livelihood strategies, and they provide a comparison of welfare effects and the sustainability of different livelihood strategies.

Second, previous research and analysis failed to consider the impact of psychological changes under certain socio-economic conditions on livelihood strategies and the sustainable development of farmers' families [56,57], so the livelihood capital of farmers' expectation of future life has been added. Land is one of the most important livelihood capitals of farmers, but it has the characteristics of fixity and relative stability. Farmers' land and surrounding external environment have an important impact on farmers' livelihood strategies, and the expectation of future life will also have an important impact on farmers' livelihood strategies.

Third, these results provide new insights into how farmland lease-out affects rural household livelihood, and therefore complements the former conclusions that farmland lease affects livelihood [58–60]. This study contributes to the literature by improving our understanding of the influence of land on the livelihood framework. On the basis of the DFID sustainable livelihood analysis framework, combined with the situation of Jiangxi Province, this paper enriches the analysis framework, discusses the livelihood capital of farmland lease-out households, and adds the trend analysis of farmers' future livelihood strategy selection. This research included the item "Future Livelihood Strategy Plan" in the questionnaire survey. The answers of farmers reflect the factors influencing farmers' choices about livelihood strategy and future livelihood strategy to a certain extent. Analyzing and understanding the future livelihood strategy plan of farmers' households can provide a certain theoretical basis for policymakers. This paper systematically analyzes the livelihood adjustment intentions of the sample farmers and the main reasons for households planning to change their livelihood strategies.

Even though this study has contributed to an improved understanding of the relationship between farmland lease-out and rural household livelihood, there still exist some deficiencies that need further research. First, this paper only investigated and analyzed the rural household livelihood after the farmland lease-out, and it does not make a comparative analysis of the situation before and after the land lease-out, which cannot eliminate the common impact of the macro social environment. The reason why the family planning situation of households before lease-out was not investigated was that it was difficult to investigate the livelihood capital of farmers before the land lease. In the process of field investigation, we found that farmers were very vague about the family situation before farmland lease. Second, this study has not considered the impact of life cycle evolution on livelihood strategies. With changes in the family life cycle, the overall family characteristics are also evolving, which will have different effects on livelihood strategies. The reason why this paper fails to consider the family life cycle is the lack of information on other family members in the survey data. Therefore, in future research, the division of different stages of family life cycle should be included in the research framework, information for each family member should be fully investigated in the research process and the unique perspective of family life cycle in family human capital analysis should be fully considered.

## 6. Conclusions

In the context of the National Rural Revitalization Strategy and the goal of ensuring the sustainable development of rural households, based on the survey data of 382 rural households in Jiangxi Province, this paper describes the relationship between rural households' livelihood strategy and family characteristics, farmers' family livelihood strategy and their livelihood capital, and it uses the seemingly unrelated regression model and the binary logistic model to analyze the relationship between farmland lease-out, farmers' livelihood capital and farmers' livelihood strategies. The research conclusions are as follows:

The livelihood strategies of farmers are divided into several types including pure agricultural type, agricultural pluriactivity type, off-farm pluriactivity type and off-farm employment type. Cross statistical analysis is used to analyze farmers' family livelihood strategies and family characteristics, farmers' family livelihood strategies and livelihood capital. The proportion of labor under the age of 45 by family type is: off-farm employment type > off-farm pluriactivity type > agricultural pluriactivity type > pure agricultural type. Pure agricultural type families' natural capital ranked highest, and farmers with high physical capital and financial capital preferred a pluriactivity livelihood strategy. Human capital is the key factor affecting the transformation of farmers' livelihood strategy.

Farmland lease-out does not affect the human capital of farmers' families, but has a negative impact on their social capital, natural capital and expectation of future life, and has a positive impact on financial capital and physical capital. Farmland lease-out has a significant negative impact on agricultural pluriactivity-type households' livelihood strategy but has a significant positive impact on the off-farm employment livelihood

strategy. And the scale of farmland lease-out has a positive impact on the choice of off-farm pluriactivity-type and off-farm employment livelihood strategies.

Natural capital negatively influenced the choice of agricultural pluriactivity-type, off-farm pluriactivity-type, and off-farm employment-type livelihood strategies compared to pure agricultural-type households. Financial capital positively influences the choice of off-farm pluriactivity-type and off-farm employment-type livelihood strategies by farm households. Human capital negatively influenced the choice of pure agricultural-type livelihood strategies and positively influenced the choice of agricultural pluriactivity-type livelihood strategies. Social capital significantly and positively influences farmers' choice of agricultural pluriactivity-type livelihood strategies. Physical capital had no significant effect on the choice of livelihood strategies. Expectation of future life had a negative effect on the choice of off-farm employment-type livelihood strategies, and a positive effect on the choice of both agricultural pluriactivity-type and off-farm pluriactivity-type livelihood strategies.

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