

Article

Social Security, Intergenerational Care, and Cultivated Land Renting Out Behavior of Elderly Farmers: Findings from the China Health and Retirement Longitudinal Survey

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Abstract: In China, the transfer of land management rights has always been a topic of much discussion, as it plays an important role in improving land use efficiency, achieving the optimal allocation of agricultural resources, and protecting farmers' rights and interests. With the advent of an aging society, elderly farmers are becoming the main force of agricultural production, and their land transfer behavior influences the land transfer situation in China. Based on three-period panel data from the China Health and Retirement Longitudinal Survey (CHARLS), this study uses a binary linear regression model to explore the effects of social security, intergenerational care, and their interactions with elderly farmers' cultivated land renting out behavior. The results show variability among elderly farmers across different regions of China, as well as a variability in other characteristics that influence cultivated land renting out behavior. It was found that: (1) pension insurance had a significant positive effect on elderly farmers' cultivated land renting out behavior, while the effect of medical insurance was not significant. Elderly farmers who participated/received pension insurance were 4.3% more likely to choose to rent out farmland, compared to those who did not do so. (2) The frequency of intergenerational care had a significant negative effect on elderly farmers' cultivated land renting out behavior, while the intensity of intergenerational care had no significant effect. (3) There was an interaction between the frequency of intergenerational care and social security, whereby a high frequency of intergenerational care was found to increase the probability of renting out farmland among elderly farmers with pension insurance.

Keywords: social security; intergenerational care; cultivated land renting out behavior; elderly farmers



Citation: Sun, J.; Cheng, P.; Liu, Z. Social Security, Intergenerational Care, and Cultivated Land Renting Out Behavior of Elderly Farmers: Findings from the China Health and Retirement Longitudinal Survey. *Land* **2023**, *12*, 392. <https://doi.org/10.3390/land12020392>

Academic Editor: Dingde Xu

Received: 20 December 2022

Revised: 29 January 2023

Accepted: 29 January 2023

Published: 31 January 2023



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1. Introduction

The transfer of land management rights is of great significance to promote appropriate scale operation, improve land use efficiency, achieve an optimal allocation of agricultural resources, and safeguard farmers' rights and interests [1–3]. Accordingly, in recent years, it has been the focus of activity of the Chinese government on rural land. However, despite the implementation of a series of support policies by the Chinese government, the rate of land transfer is currently low [4], and the problems of land abandonment and fallowing still exist in some areas [5,6]. Under the dual influence of population aging and population migration [7], agricultural production in China has experienced a notable aging trend [8], whereby middle-aged and elderly farmers have gradually become the main labor force in rural areas. Elderly farmers are unable to cultivate large areas of land due to their limited labor capacity, which results in an increasing proportion of abandoned and inefficient use of land [9]. Land transfer is one of the main ways to solve this problem. Hence, in this context, it is important to explore the factors affecting the land transfer behavior of elderly farmers, so as to guide the evaluation of the land transfer status of elderly farmers in China and the formulation and implementation of corresponding policies.

Currently, a growing body of literature has studied the land transfer behavior of elderly farmers. Since land has an important old-age security function for elderly farming

households [10], the majority of the factors influencing their land transfer behavior are related to the weakening or replacing of such a security function. In particular, non-farm employment, pension insurance, and intergenerational support are currently the main topics of scientific discussion. With the rapid development of urbanization in China, a large number of rural laborers have moved to cities, and non-farm employment has become an important way for older farm households to increase their income in their later years. Some studies have shown that older farming households involved in non-farm employment are more likely to rent out their farmland [11]. In particular, older farming households who are non-farm self-employed are more likely to rent out their farmland and replace farming labor with non-farm employment [12]. In addition, pension insurance significantly affects the land transfer behavior of elderly farmers. Because pensions can, to some extent, increase household welfare, allowing elderly farmers to meet their necessary monetary expenditures [13], and have a substitute effect on the old-age security function of land, having a pension can encourage elderly farmers to rent out their land [14,15]. On the other hand, child support within Chinese households has been the most important source of old-age security for elderly farm households. Accordingly, scholars have found that children's financial support to elderly farmers has a positive effect on elderly farmers' land transfer [16].

These studies analyzed the cultivated land renting out behavior of elderly farmers mainly based on the perspective of material security, thereby ignoring their physical and mental health needs. In fact, health status is an important factor affecting the later life of elderly farmers; social medical insurance, as an important social security system to improve elderly farmers' health, can help reduce the productivity loss and medical expenses of elderly farmers due to illness, and can effectively improve health levels and labor supply efficiency [17]. Therefore, medical insurance will have an impact on the land transfer behavior of elderly farmers. On the other hand, the "joy of family" is an important spiritual source for Chinese people. It refers to the family fun between the older generation and the younger generation who are related by blood and, more generally, to the joy of family reunion. Traditionally, in China, the contribution of grandparents to raising grandchildren is an important method of family nurturing, and contributes to building an important intergenerational link between grandparents and grandchildren [18]. Some studies have shown that by providing care for grandchildren, elderly farmers can share the parenting stress of their own children, with a positive effect on their own psychological health [19]. At the same time, the possibility of engaging in various intellectual and physical activities in the process of caring for grandchildren also contributes to improved cognitive functions [20]. Hence, both decisions of whether or not to participate in medical insurance and whether or not to care for grandchildren are important for elderly farmers. Without considering these two aspects, it may not be possible to fully understand the land transfer behavior of elderly farmers.

Based on these considerations, this study made the following contributions to existing research. First, this study developed an analytical framework that integrates the effects of elderly farmers' material security, physical health, and mental health needs on their cultivated land renting out behavior, combining social security, intergenerational care, and elderly farmers' cultivated land renting out behavior. On the one hand, social security includes social pension insurance and social medical insurance, both of which address the material security and physical health needs of elderly farmers. On the other hand, intergenerational care focuses on the psychological health needs of elderly farmers. Second, this study empirically analyzed the effects of social security and intergenerational care on elderly farmers' cultivated land renting out behavior through a binary linear regression model. In addition, this study further investigated the interactive effects of social security and intergenerational care on elderly farmers' cultivated land renting out behavior. Third, this study took into account both spatial and temporal factors. On the one hand, the nationwide China Health and Retirement Longitudinal Survey (CHARLS) panel data for the elderly were selected to analyze the differences among eastern, central, and western

regions of China. These data are highly credible and representative, and could provide a comprehensive understanding of the cultivated land renting out behavior of elderly farmers in China. On the other hand, the selection of panel data spanning 6 years and the tracking of the farmland transfer status of survey respondents in 2013, 2015, and 2018 allowed us to provide a comprehensive assessment of the cultivated land renting out behavior of elderly farmers. Considering that the majority of elderly farmers are the ceding parties in land transfer [21], this study only focused on the renting out behavior of elderly farmers.

2. Materials and Methods

2.1. Analytical Framework

Before carrying out specific empirical analysis, it was necessary to elaborate and analyze the theoretical mechanism of the impact of social security and intergenerational care on the cultivated land renting out behavior of elderly farmers. For a long time, China's rural social security system has been relatively imperfect compared to urban areas, and cultivated land has been regarded by farmers as the basic means for personal subsistence during their pension age. However, due to the increase in farmers' ages and the decline of their labor capacity, the phenomenon of renting out cultivated land may occur. Hence, when the rural social security system is improved, and especially when the medical insurance and pension insurance are close to full coverage, it is worth assessing whether the insured elderly farmers are willing to rent out their farmland. Moreover, as caring for grandchildren is also part of the later life of the rural elderly group, the question arises as to whether an increase in the frequency and intensity of intergenerational care would reduce the amount of time available to elderly farmers to cultivate their land, which in turn would directly encourage them to rent out their cultivated land. Therefore, by controlling other influencing factors, this study focused on the impact of social security and intergenerational care on the cultivated land renting out behavior of elderly farmers. It should be noted that this study assumed that elderly farmers are rational agents, who make the best choice according to their own conditions.

2.1.1. The Influence Mechanism of Social Security on Elderly Farmers' Cultivated Land Renting Out Behavior

Rural social security plays a very important role in people's livelihoods, mainly through social pension insurance and medical insurance. Some studies explored the impact of social pension insurance on the cultivated land renting out behavior of elderly farmers [22,23], while others have examined the impact of social medical insurance [24,25]. Previous studies only considered the effect of one type of social insurance on elderly farmers' cultivated land renting out behavior; however, the latter is not determined by one type of social insurance [26], but rather by the combined role of social security including both social pension insurance and social medical insurance. The material security role of social pension insurance and the physical health role of social medical insurance can jointly influence elderly farmers' cultivated land renting out behavior. However, few studies have considered the effects of both social pension insurance and social medical insurance on this type of behavior. The choice of renting out farmland is a voluntary act of farmers, and their evaluation of the role of social security influences their rental decisions. Therefore, understanding the impact of social security on the renting out behavior of elderly farmers is an area worthy of further study.

With the implementation of China's policy of support to farmers, the development of the rural economy, and the intensification of aging, the rural social security system has been constantly improved and optimized. The number of elderly people who choose to participate in pension insurance and medical insurance schemes has been increasing. Moreover, the ways to provide for elderly farmers in rural areas have been gradually diversified, while the security functions of rural cultivated land, such as the survival and subsistence of the elderly, have been gradually weakened. Therefore, the security function of rural cultivated land has been replaced to some extent. Hence, the question is open as

to whether the meaning of cultivated land for elderly farmers will change, and if elderly farmers will choose to rent out cultivated land. Based on these considerations, the following hypothesis was advanced:

Hypothesis 1. *Social security has a substitution effect on the function of rural farmland security; the higher the social security, the higher the probability of occurrence of cultivated land renting out behavior by elderly farmers, although the effect of pension insurance and medical insurance may be different.*

2.1.2. The Influence Mechanism of Intergenerational Care on Elderly Farmers' Cultivated Land Renting Out Behavior

In relation to the effect of intergenerational care on elderly farmers' cultivated land renting out behavior, previous research showed that the former has a significant crowding-out effect on elderly farmers' farmland working time, because it occupies them for a certain amount of time [27]. However, intergenerational care behavior can only reflect the effect of the presence or absence of this behavior on elderly farmers' cultivated land renting out behavior, and cannot accurately and effectively analyze the effect of the frequency and intensity of intergenerational care on that behavior. With the rapid urbanization and aging of the population, rural families have gradually formed an economic structure characterized by "children working outside and parents aging at home" [28]. Facing a high cost of living, some children choose to bring their aging parents with them and ask them to help take care of their grandchildren. The result is that elderly farmers leave the villages where they lived for a long time and come to the cities exclusively to take care of their grandchildren. In parallel, other children choose to send their children back to the countryside, and ask their parents to take care of them at home. In this way, elderly farmers need to take care of their grandchildren's lives and education in addition to farming. On the one hand, the intergenerational care provided by aging parents helps their children by reducing the pressure of raising their own children; on the other hand, it promotes a harmonious relationship between the three generations, and elderly people receive effective intergenerational spiritual support [29]. Therefore, intergenerational care becomes an important decision for elderly farmers in their later years. With the increase in the frequency and intensity of intergenerational care, the amount of time elderly farmers spend working on the land decreases accordingly, and the likelihood of renting out farmland increases. In addition, another scenario may also occur. In households with a low income, elderly farmers have not only to secure their own livelihoods, but also to subsidize their children; therefore, they continue to work on the land while at the same time helping their children with child care, which reduces the likelihood of renting out land.

In China, under the general trend of urban–rural integration and large-scale population mobility, an increasing number of young adults are choosing to settle in cities and towns, and the traditional model of intergenerational rural family life is gradually being broken. With the increasing cost of urban living, education, and housing, young adults of rural origin usually invite their older parents to take care of their grandchildren to reduce the cost and pressure of caregiving. In turn, the increased intensity and frequency of intergenerational care by elderly farmers reduce their time for farming. Therefore, in this case, will elderly farmers choose to rent out their farmland? Based on these considerations, the following hypothesis was advanced:

Hypothesis 2. *Intergenerational care has a crowding-out effect on the time spent by elderly farmers on farming. In more detail, the higher the frequency and intensity of intergenerational care, the greater the likelihood that elderly farmers will rent out their farmland; however, the opposite may also be true.*

2.1.3. The Relationship between Social Security and Intergenerational Care

Several decisions of elderly farmers are influenced by both social security and intergenerational care. Therefore, the analysis of elderly farmers' cultivated land renting

out behavior cannot ignore either social security, which has the function of providing material security and promoting physical health, or intergenerational care, which has the function of promoting psychological health. Specifically, elderly farmers who participate in pension insurance schemes have a stable source of income from their pension, which releases income constraints to a certain extent and reduces the possibility of continuing farming. Such a reduction in farming time will, in turn, increase their leisure time [30], as well as the frequency and time dedicated to intergenerational care; consequently, the likelihood that elderly farmers will rent out their farmland will increase. However, older adults may damage their physical and mental health if they are overworked when caring for their grandchildren [31]. In these cases, children usually give their parents some financial support and help them purchase medical insurance out of gratitude for their help in caring for their own children, as well as to protect their physical and mental health. This analysis fully illustrates the need to consider the dual influence of social security and intergenerational care in analyzing elderly farmers' cultivated land renting out behavior, as this allows to avoid omissions and errors in building measurement models. Moreover, it is also useful to assess the interactive effects of social security and intergenerational care on elderly farmers' cultivated land renting out behavior.

The relationship between social security and intergenerational care becomes particularly important in the dual reality of changing family structures and deeply entrenched traditional attitudes. In rural areas in particular, where intergenerational care is common, the time and frequency of caring for grandchildren increase when elderly farmers' economic income is relatively stable; as a consequence, the excessive time and energy spent by elderly farmers on caring for their grandchildren increases the risk of illness, and motivates them to enroll on medical insurance schemes. Thus, there is an interaction between social security and intergenerational care, which will also have an impact on elderly farmers' cultivated land renting out behavior. Based on these considerations, the following hypothesis was advanced:

Hypothesis 3. *Social security and intergenerational care interact with and influence each other, and both affect elderly farmers' cultivated land renting out behavior, although the effects of the interaction terms of the different variables may differ.*

Figure 1 shows the analytical framework developed in this study, which considers the cultivated land renting out behavior of elderly farmers from the dual perspective of social security and intergenerational care.

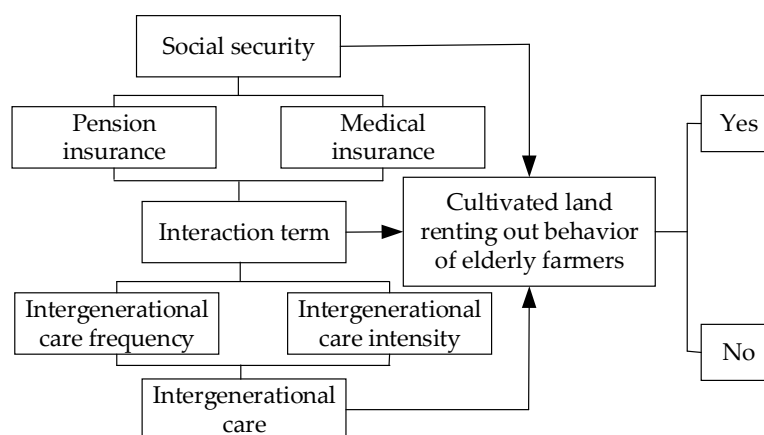


Figure 1. Analytical framework.

2.2. Data Sources

Hosted by the National Development Research Institute of the Peking University, the CHARLS survey used Geographic Information System (GIS) technology and the map

method to create village-level sampling frames. GIS technology is used to describe and characterize the sampling of sample data in each province of China, showing the spatial distribution of sample data in each province, as shown in Figure 2. It employed the population proportion sampling method to conduct household surveys of middle-aged and elderly people in 28 provincial administrative regions, 150 county-level units, and 450 village-level units in China. The design of the questionnaire was based on international experience, and the quality of the data was the highest among other similar international survey projects, contributing to the wide recognition of the results of the survey data. In this study, we selected panel data for three years, namely 2013, 2015, and 2018, and engaged elderly farmers to participate in three rounds of follow-up surveys and receive collective allocations of farmland as the main study population. After eliminating the invalid samples, we finally obtained 7848 samples.

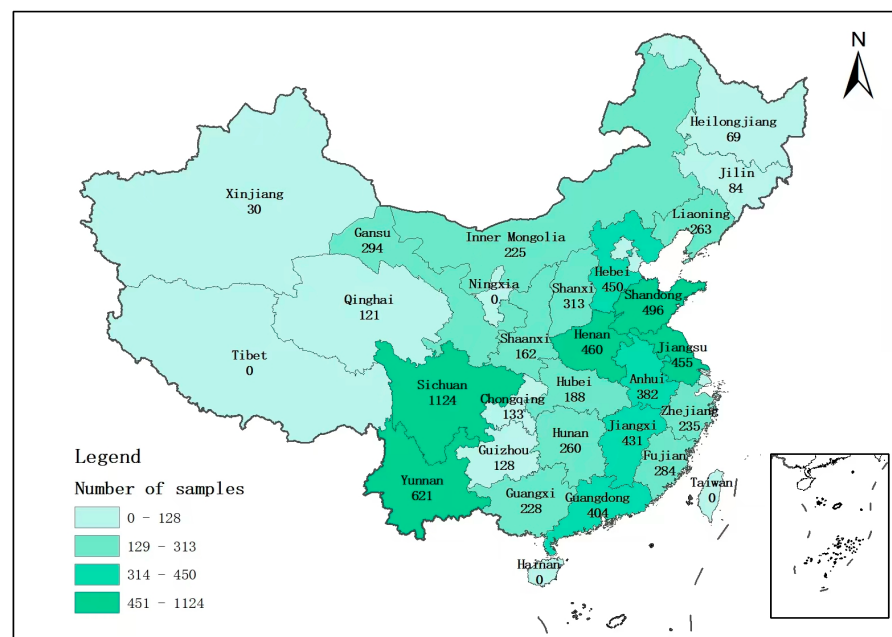


Figure 2. Distribution of sample data by province in China.

2.3. Model Construction

As the cultivated land renting out behavior of elderly farmers can be represented as a binary variable, this study selected a binary linear regression model (Logistic) to explore the relationship between social security, intergenerational care, and the cultivated land renting out behavior of elderly farmers. The specific model is as follows:

$$Land_{it} = \beta_0 + \beta_1 Security_{it} + \beta_2 Raising_{it} + \beta_3 Z_{it} + \theta Time + \mu Area + \varepsilon_{it}$$

where $Land_{it}$ represents the dummy variable of whether the i -th elderly farmer household will rent out cultivated land in year t ; a value of $Land_{it} = 1$ indicates that elderly farmers will rent out cultivated land, while a value of $Land_{it} = 0$ indicates that they will not do so. $Security_{it}$ represents social security, mainly including medical insurance and pension insurance; $Raising_{it}$ refers to intergenerational care, mainly including intergenerational care frequency and intergenerational care intensity; β_0 is the intercept item; β_1 is the coefficient of the corresponding variable; Z_{it} is the control variable vector; $Time$ is the time effect; $Area$ is the regional effect; and ε_{it} is the error term.

2.4. Variable Selection

Table 1 provides a detailed definition of each variable.

Table 1. Definitions and descriptive statistics of the variables.

Variable	Definition	Mean	S.D.	Min	Max
Cultivated land renting out	1 = Yes; 0 = No	0.184	0.388	0	1
Pension insurance	1 = Yes; 0 = No	0.554	0.497	0	1
Medical insurance	1 = Yes; 0 = No	0.956	0.205	0	1
Intergenerational care frequency	Actual care frequency	15.676	29.309	0	574
Intergenerational care intensity	Actual care time	19.878	241.512	0	4732
Gender	1 = Male; 0 = Female	0.467	0.499	0	1
Age	60–69 years old = 1 70–79 years old = 2 80 years old and above = 3	1.967	0.882	1	3
Health status	Continuous variable, from 5 to 20	20.318	2.685	5	24
Marital status	Normal marriage = 1 Irregular married = 0	0.792	0.406	0	1
Family savings	Actual savings	5786.602	22,057.950	0	802,000
Number of grandchildren	Actual number	1.188	2.581	0	32
Value of agricultural assets	Actual value	830.948	9325.841	0	700,000
Cultivated area	Actual area	5.662	11.580	0	300
Rental price	Actual price	501.827	1271.003	0	51,000

2.4.1. Explained Variable

The explained variable in this study is whether or not the arable land owned by elderly farmers is rented out. Elderly farmers who have rented out their arable land were assigned a value of 1, and those who have not done so, were assigned a value of 0. Since only cultivated land was considered in this study, forest land, garden land, and pasture were excluded from the questionnaire.

2.4.2. Explanatory Variables

The first explanatory variable of this study is social security, which is composed of old-age insurance and medical insurance. Pension insurance was measured according to the following question in the questionnaire: “Do you participate in/receive the new rural pension insurance, or the urban and rural residents’ pension insurance?”. Medical insurance was measured according to the question: “Do you participate in/receive the new rural cooperative medical insurance, or urban and rural residents’ medical insurance?”. Those respondents that answered affirmatively to the first question were considered to have pension insurance and were assigned a value of 1, and 0 otherwise. Accordingly, if they answered affirmatively to the second question, they were assigned a value of 1, meaning that they were enrolled in/received medical insurance, and 0 otherwise.

The second explanatory variable is intergenerational care, which is composed of the frequency and intensity of intergenerational care. The frequency of intergenerational care was measured as a continuous variable using the question: “In the past year, how many weeks did you spend caring for your grandchildren?”. The intensity of intergenerational care was measured by the question: “In the past year, how many hours per week did you spend caring for your grandchildren?”. The intensity of intergenerational care was also considered as a continuous variable indicating the amount of time spent on caregiving by elderly farmers, where the longer the time, the greater the intensity of intergenerational care.

2.4.3. Control Variables

The control variables considered in this study relate to three main dimensions, namely the personal characteristics, household characteristics, and farming status of elderly farmers.

In the personal characteristics dimension, this study selected the age, gender, marital status, and health status of elderly farmers as control variables. Specifically, the variable ‘age’ indicated the actual age of elderly farmers; the variable ‘gender’ was assigned a value of 1 for men and 0 for women; ‘marital status’ was measured with the question: “What is your current marital status?”. ‘Health status’ was measured according to the scores of the Activity of Daily Living Scale (ADL) calculated based on a questionnaire, which covers elderly farmers’ dressing, bathing, toileting, and bowel control.

In the household characteristics dimension, the number of grandchildren, household savings, and farm asset value of elderly farmers were selected as control variables. The variable ‘number of grandchildren’ indicated the actual number of grandchildren of the respondent; ‘household savings’ included the sum of cash income, electronic income, and stock income; and ‘farm asset value’ indicated the sum of tractors, threshers, mechanized farming equipment, pumping machines, and processing machinery.

In the dimension of farming status, this study selected farming area and rental price as control variables. The cultivated land area was measured based on the question: “How many mu of cultivated land do you have?”. The rental price of cultivated land was measured based on the question: “What is the rent per mu per year you would get if you rent out all your cultivated land?”.

3. Results

3.1. Descriptive Statistics of the Variables

In Figure 3, A–D respectively represent the area of cultivated land allocated, rented area of cultivated land, rent out probability of cultivated land and rent price of cultivated land in different years of the country, Eastern and western regions. As shown in Figure 3, from 2013 to 2018, the area of arable land received by elderly farm households in China from collective allocation gradually decreased from 6.11 mu/household in 2013 to 5.29 mu/household in 2018. On the other hand, in the same period the area of arable land rented out by elderly farm households increased from 5.35 mu/household in 2013 to 6.23 mu/household in 2018. These results indicate a relative increase in the fragmentation of arable land. In terms of access to collectively allocated arable land, the decrease in arable land area occurred mainly in the western region of China, with an approximate decrease of 29% from 2013 to 2018. In terms of the area of arable land rented out, a clear difference was observed between regions, with an increase in the eastern region of China from 5.64 mu/household in 2013 to 7.91 mu/household in 2018, corresponding to an increase of 40.25%. At the same time, a significant decrease was observed in the area of arable land rented out in the central region of China, from 5.79 mu/household in 2013 to 2.39 mu/household in 2018, corresponding to a decrease of 58.72%.

A certain variability was found in the probability of elderly farmers renting out arable land, as well as in the rental price, across regions, although both variables generally followed an increasing trend throughout the study period. The proportion of elderly farmers who chose to rent out their arable land increased from 12.87% in 2013 to 26.08% in 2018, corresponding to an increase of 102.64%. In the western region in particular, the frequency of renting out arable land increased from 11.42% in 2013, i.e., the lowest level in the country, to 29.74% in 2018, i.e., the highest level in the country. Moreover, the rent price of arable land rose from 428.74 CNY/mu in 2013 to 555.28 CNY/mu in 2018, with an average price increase of about 1.3 times across the study period. In more detail, the rent price of cultivated land increased the most in the western region, from 428.58 CNY/mu in 2013 to 660.44 CNY/mu in 2018, corresponding to, an increase of 54.10%. Moreover, the rent price of arable land in the eastern and western regions was significantly higher than in the central region.

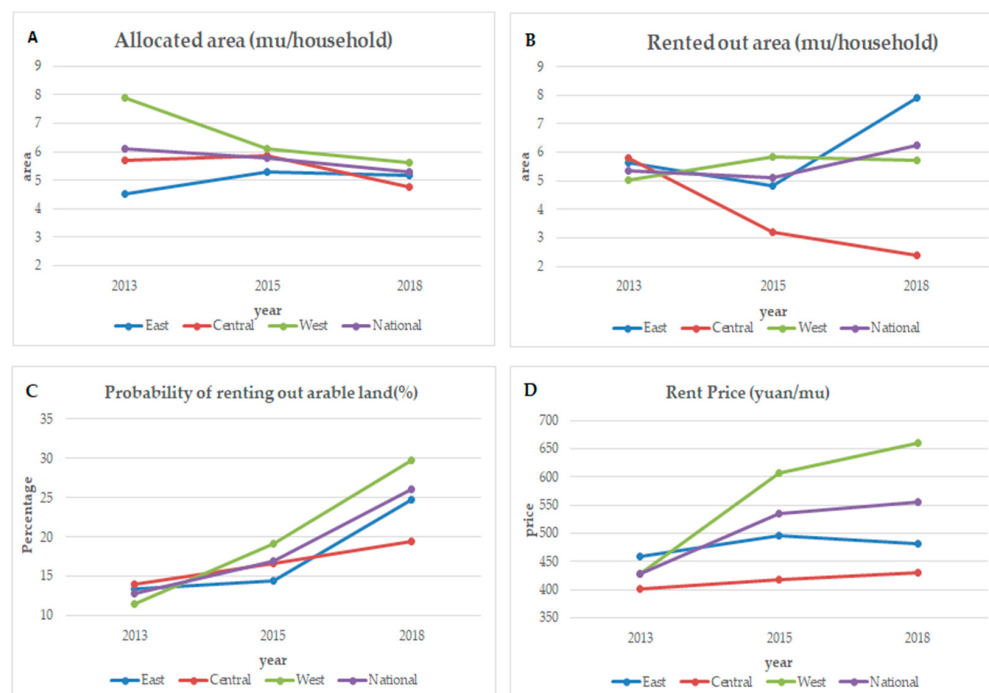


Figure 3. Renting out of arable land by elderly farmers in China at national level and in the eastern, central, and western regions.

Figure 4 presents the choices of elderly farmers' cultivated land renting out behavior under different social security and intergenerational care scenarios, a represents the cultivated land renting out behavior of elderly farmers under different medical insurance conditions, b represents the cultivated land renting out behavior of elderly farmers under different pension insurance conditions, c represents the cultivated land renting out behavior of elderly farmers under different frequency of intergenerational care, and d represents the cultivated land renting out behavior of elderly farmers under different intensity of intergenerational care. A simple processing of the sample data through the cross-tabulation table shows that, in terms of social security, the proportion of elderly farmers with medical insurance who chose to rent out their farmland was greater than that of those without medical insurance, with a cumulative increase of 2.54% from 2013 to 2018. Moreover, the proportion of elderly farmers with pension insurance who rented out their farmland was higher than that of those without pension insurance, with a total increase of 8.58% from 2013 to 2018. In addition, the proportion of elderly farmers with pension insurance who rented out their farmland was about 2.54% higher than that of elderly farmers with medical insurance, which indicates that pension insurance is a stronger substitute for the land security function. In terms of intergenerational care, the higher the frequency of intergenerational care, the lower the proportion of elderly farmers who rented out their farmland, while the lower the frequency, the more likely farmers were to rent out their farmland. Moreover, intergenerational care intensity was found to have a facilitating effect on the renting out behavior of elderly farmers, where the higher the intergenerational care intensity, the higher the likelihood of renting out farmland.

Table 2 shows the well-being of elderly farmers across different intergenerational care situations. In terms of the frequency of intergenerational care, the happiness of elderly farmers with a high frequency of intergenerational care was 0.29% higher than that of those with a low frequency. These results were basically consistent with those for intergenerational care intensity; in fact, the overall happiness of elderly farmers with a high intensity of intergenerational care was 1.06% higher than that of those with a low intensity.

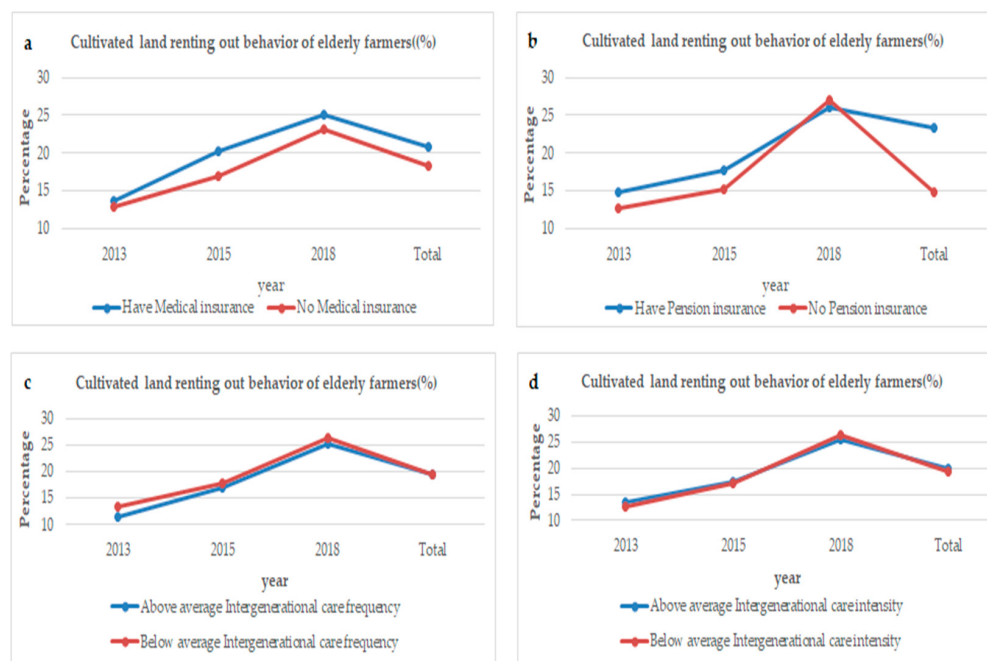


Figure 4. Cultivated land renting out behavior of elderly farmers under different circumstances (%).

Table 2. Well-being of elderly farmers under different intergenerational care situations (%).

Variable		2013		2015		2018		Total	
		High Happiness	Low Happiness	High Happiness	Low Happiness	High Happiness	Low Happiness	High Happiness	Low Happiness
Intergenerational care frequency	Above average	26.08	73.92	45.47	54.53	38.28	61.72	37.06	62.94
	Below average	25.19	74.81	43.87	56.13	37.95	62.05	36.77	63.23
Intergenerational care intensity	Above average	26.16	73.84	46.00	54.00	38.43	61.57	37.55	62.45
	Below average	25.19	74.81	43.60	56.40	37.85	62.15	36.49	63.51

3.2. The Effects of Social Security and Intergenerational Care on Elderly Farmers' Cultivated Land Renting Out Behavior

Stata version 16.0 (Stata Corporation, College Station, TX, USA) was used to analyze the survey data. In order to accurately reflect the impact of different variables and take into account the robustness of the model, this study adopted a stepwise regression method to investigate the impact of social security and intergenerational care on the cultivated land renting out behavior of elderly farmers, gradually adding other influencing factors into the econometric model. The estimated results of the four groups of models for elderly farmers' cultivated land renting out behavior are shown in Table 3. Models 3-1, 3-2, 3-3, and 3-4 represent the effects of social security variables, intergenerational care variables, social security and intergenerational care variables (without control variables), and social security and intergenerational care variables (with control variables) on elderly farmers' cultivated land renting out behavior, respectively.

3.2.1. The Effects of Social Security on Elderly Farmers' Cultivated Land Renting Out Behavior

From the results of model 3-1, it can be seen that the fact of having pension insurance was positively related to elderly farmers' cultivated land renting out behavior, which passed the significance test at the level of 1%. The marginal effect results show that the

elderly farmers with pension insurance are 9.7% more likely to rent their farmland than those without pension insurance. This indicates that the substitution of pension insurance for the cultivated land security function makes elderly farmers less dependent on cultivated land. That is, the elderly who receive a pension have a stronger willingness to rent out their cultivated land. Moreover, it was found that the fact of having a medical insurance was positively related to the cultivated land renting out behavior of elderly farmers, although this value did not pass the significance test. This indicates that the fact of having medical insurance did not have any significant effect on the cultivated land renting out behavior of elderly farmers.

Table 3. Effects of social security and intergenerational care on elderly farmers' cultivated land renting out behavior.

Variable	Model 3-1		Model 3-2		Model 3-3		Model 3-4	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Medical insurance	0.073 (0.204)	0.001 (0.029)			0.062 (0.227)	0.008 (0.030)	0.154 (0.273)	0.025 (0.045)
Pension insurance	0.667 *** (0.073)	0.097 *** (0.010)			0.615 *** (0.083)	0.082 *** (0.011)	0.261 ** (0.122)	0.043 ** (0.020)
Intergenerational care frequency			−0.005 ** (0.002)	−0.001 ** (0.000)	−0.005 ** (0.002)	−0.001 ** (0.000)	−0.006 ** (0.003)	−0.001 ** (0.000)
Intergenerational care intensity			0.001 (0.001)	0.000 (0.000)	0.008 (0.001)	0.000 (0.000)	0.001 (0.001)	0.000 (0.000)
Gender							0.015 (0.104)	0.002 (0.017)
Age							−0.127 * (0.068)	−0.021 * (0.011)
Health status							0.101 *** (0.023)	0.017 *** (0.004)
Marital status							−0.283 ** (0.112)	−0.046 ** (0.018)
Family savings							0.000 (0.000)	0.000 (0.000)
Number of grandchildren							0.008 (0.022)	0.001 (0.004)
Value of agricultural assets							−0.000 ** (0.000)	−0.000 ** (0.000)
Cultivated area							0.002 (0.004)	0.000 (0.001)
Rental price							0.000 ** (0.000)	0.000 ** (9.57 × 10 ^{−6})

Notes: ***, **, * represent significance at the 1%, 5%, and 10% levels, respectively. Bracketed numbers indicate standard error.

3.2.2. The Effects of Intergenerational Care on Elderly Farmers' Cultivated Land Renting Out Behavior

The results of model 3-2 showed that the variable of intergenerational care intensity, which represents the length of care given by elderly farmers to their grandchildren, was positively associated with elderly farmers' renting out behavior, although this value did not pass the significance test. This indicates that an increase in intergenerational care intensity does not increase the probability of renting out farmland by elderly farmers. The variable of intergenerational care frequency, which represents the number of caregiving activities

of elderly farmers, showed a non-linear relationship with elderly farmers' cultivated land renting out behavior. That is, elderly farmers with a lower frequency of intergenerational care are 0.1% more likely to rent out their cultivated land than those with a higher frequency of intergenerational care. In more detail, elderly farmers with a higher intergenerational care frequency were less likely to choose to rent out their farmland, while those with a lower intergenerational care frequency were more likely to do so. This may be because the intergenerational support received by elderly farmers with a higher frequency of intergenerational care is not enough to sustain their daily expenses, and they still need to rely on cultivating land to ensure a sufficient income; therefore, they are less likely to rent out their farmland. In parallel, as elderly farmers with a lower frequency of intergenerational care do not have to spend more time and energy on caring for their grandchildren, their time can be better allocated freely, and they may choose to engage in non-farm employment or enjoy family life; therefore, they are more likely to rent out their farmland. The latter choice is more common among elderly farmers who are younger and healthier.

3.2.3. The Effects of Explanatory Variables on Elderly Farmers' Cultivated Land Renting Out Behavior

Model 3-3 is an econometric model including two variables, namely social security and intergenerational care. In a similar way to model 3-1 and model 3-2, variables such as old-age insurance and frequency of intergenerational care also passed the significance test in model 3-3. Specifically, pension insurance was found to have a significant positive effect on elderly farmers' cultivated land renting out behavior. Moreover, the analysis of the marginal effects showed that this influence remained largely unchanged after adding the intergenerational care variable. The probability of elderly farmers with pension insurance choosing to rent out their cultivated land is 8.2%, and the probability of elderly farmers with a low frequency of intergenerational care choosing to rent out their cultivated land is still 0.1% compared with those with a high frequency of intergenerational care, further validating the good substitution effect of pension insurance on the land security function.

3.2.4. The Effect of Control Variables

Model 3-4 was based on model 3-3 with the addition of control variables such as personal characteristics, household characteristics, and farmland status. The results of model 3-4 showed that the effects of having pension insurance, and of the frequency of intergenerational care, on cultivated land renting out behavior remained after the addition of other control variables, which were significant at the 5% level. Hence, Hypotheses 1 and 2 were verified.

In addition, the farmers' age and marital status were found to have a significant negative effect on cultivated land renting out behavior. The probability of elderly farmers with a lower age choosing to rent out their farmland is 2.1% higher than that of the older elderly farmers. Elderly farmers with a lower age are more likely to be willing to rent out their farmland, because they are more likely to obtain economic income through off-farm employment. On the other hand, the likelihood of not being willing to rent out land is higher among older elderly farmers, because they lack the ability to, and have a relatively low probability of, obtaining off-farm employment. Of course, elderly farmers are more likely to prefer to rent out their farmland if they have lost their basic labor capacity. Moreover, the probability of renting out farmland was found to be higher in irregular marriages than in normal marriages, about 4.6 percent higher. The main reason is that normal marriages allow more people to work on farmland, which contributes to more efficient farming and a higher income, while farmers in irregular marriages are labor-constrained and their farming activities are affected to a considerable extent. The farmland asset value variable was also found to have a significant negative effect on the cultivated land renting out behavior of elderly farmers, and passed the significance test at the 5% level. This indicates that the higher the cost of farm equipment input, the higher the probability that elderly farmers will continue farming, i.e., the higher the value of farm assets, the lower the probability of

renting out farmland. The health status of elderly farmers was found to have a significant positive effect on cultivated land renting out behavior, and the higher the health status of farmers, the higher the probability of renting out farmland. This finding is contrary to the studies of some scholars, and the reasons are related to two main aspects. On the one hand, as the subjects included in the scope of this study are elderly people, whose health condition is more likely to decline with the passage of time, they are more sensitive to the damage of physical functions, or even to the dangers entailed by continuing farming, and therefore are more likely to rent out their farmland. On the other hand, although agricultural production requires a strong labor capacity, having good health is not the same as having labor capacity. In fact, good health does not mean greater labor capacity, especially for elderly farmers who are, therefore, more likely to rent out their land. Finally, the rental price of farmland was found to have a positive relationship with cultivated land renting out behavior and passed the significance test at the 5% level. This indicates that the higher the rental price of farmland, the more willing farmers will be to rent out their arable land to earn some rent and improve their quality of life.

3.3. Robustness Tests

In this study, the robustness of the underlying regression results was tested from the perspective of replacing the econometric model and subsampling, using the Probit model and grouping the sample data.

3.3.1. Probit Model Estimation

This study uses the Probit model to re-estimate the effect of social security and intergenerational care on the cultivated land renting out behavior of elderly farmers. The estimation results using the Probit model, presented in Table 4, were found to be basically consistent with those obtained using the Logistic model (shown Table 3); moreover, when no control variables were added, the marginal effect of pension insurance and intergenerational care frequency were 0.082 and 0.001, respectively. With the addition of control variables, the marginal effect of pension insurance and intergenerational care frequency were 0.045 and 0.001, respectively. The regression coefficients and the marginal effects did not change significantly. This indicated that the estimation results of the base regression in this study were robust.

Table 4. Estimation results using the Probit model.

Variable	Model 4-1		Model 4-2	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Medical insurance	0.035 (0.124)	0.008 (0.030)	0.096 (0.158)	0.027 (0.046)
Pension insurance	0.342 *** (0.046)	0.082 *** (0.011)	0.157 ** (0.069)	0.045 ** (0.020)
Intergenerational care frequency	−0.003 ** (0.001)	−0.001 ** (0.000)	−0.004 *** (0.001)	−0.001 ** (0.000)
Intergenerational care intensity	0.000 (0.000)	0.000 * (0.000)	0.001 (0.001)	0.000 (0.00)
Control Variables	×	×	✓	✓
Time	×	×	×	×
Area	×	×	×	×

Notes: ***, **, * represent significance at the 1%, 5%, and 10% levels, respectively. Bracketed numbers indicate standard error.

3.3.2. Data Grouping Test

Sub-regional test: Considering the large differences between the eastern and western regions of China in terms of natural location conditions, economic development level, and

infrastructure construction, this study rearranged the sample data of the provinces (or districts and cities) into sub-sample data from the eastern, central, and western regions, following the geographical categories employed by the National Bureau of Statistics, and examined the effects of social security and intergenerational care on elderly farmers' cultivated land renting out behavior across regions. The estimation results, presented in Table 5, were basically consistent with the base regression results in Table 3 for the eastern region. Elderly farmers with pension insurance are 5.8% more likely to rent their farmland than those without pension insurance, elderly farmers with a lower frequency of intergenerational care are 0.2% more likely to rent out their cultivated land than those with a higher frequency of intergenerational care. Additionally, results showed that both pension insurance and intergenerational care frequency had a statistically significant effect on elderly farmers' cultivated land renting out behavior. This fully shows that the baseline regression results have good robustness and persuasion. While the frequency of intergenerational care in the western region had no statistically significant effect, only pension insurance had a statistically significant effect at the statistical level. In addition, pension insurance and intergenerational care frequency in the central region did not have a significant effect on the cultivated land renting out behavior of elderly farmers. There are differences between the regression results and the baseline regression results in the central and western regions, indicating that the differences between regions and between regions and the whole country will lead to a heterogeneity of results.

Sub-residence test: Theoretically, an increase in the intensity and frequency of intergenerational care would lead to an increase in the probability of renting out cultivated land, as elderly farmers spend less time on farming. However, according to the results of the field study questionnaire, a high frequency of intergenerational care was not found to increase the probability of renting out cultivated land by older people, but rather to decrease it. It has been suggested in Section 2.1.2. above that this may be due to the relatively poor economic conditions of their children, which encourage elderly farmers to provide intergenerational care to help them reduce their financial pressures. In fact, as their children may provide only little support to elderly farmers, the latter need to intermittently engage in farming to earn a higher income. Another important factor that further explains this view is the geographical distance at which children live from their parents. In general, the closer parents and children live, the higher the mutual support, while the farther parents live from their children, the lower the mutual support. Families with greater mutual support will have a relatively lower cost of living and produce less pressure on elderly farmers' retirement, while those with less mutual support will have a higher cost of living and more pressure on elderly farmers' retirement. Therefore, the further elderly farmers live from their children, the more frequent the intergenerational care, and the less likely that arable land will be rented out. To test this conjecture, this study divided the sample data into two groups: a group including elderly farmers and their children who had the same household registration but different places of residence; and another where they had the same household registration and the same place of residence. As can be seen from Table 6, the effect of intergenerational care frequency on elderly farmers' cultivated land renting out behavior was negative in both cases where elderly farmers had the same residence (model 6-1) or a different residence (model 6-2) to their children; moreover, the marginal effect of different residences was larger and more pronounced at the statistical level. When elderly farmers and their children live in different residences, the elderly farmers with pension insurance are 11.5% more likely than those without pension insurance to rent out the cultivated land, while with elderly farmers and their children who live in the same residences, the probability is only 8.1%. This indicates that in the case of different residences, the frequency of intergenerational care is higher, while the likelihood of renting out cultivated land is lower. The basic regression results were again validated.

Table 5. Results of the sub-regional tests of the sample data.

Variable	Eastern Region				Central Region				Western Region			
	Model 5-1		Model 5-2		Model 5-3		Model 5-4		Model 5-5		Model 5-6	
	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Medical insurance	0.422 (0.409)	0.059 (0.057)	0.342 (0.422)	0.057 (0.069)	−0.846 ** (0.420)	−0.092 ** (0.046)	−0.985 * (0.499)	−0.121 * (0.061)	0.309 (0.368)	0.043 (0.052)	0.397 (0.402)	0.067 (0.068)
Pension insurance	0.355 ** (0.138)	0.050 ** (0.019)	0.354 ** (0.152)	0.058 ** (0.025)	0.211 (0.199)	0.023 (0.022)	0.115 (0.228)	0.014 (0.028)	0.946 *** (0.130)	0.133 *** (0.018)	0.754 *** (0.143)	0.128 *** (0.024)
Intergenerational care frequency	−0.010 ** (0.004)	−0.001 ** (0.001)	−0.011 ** (0.004)	−0.002 ** (0.001)	−0.006 (0.004)	−0.001 (0.000)	−0.009 * (0.005)	−0.001 * (0.001)	−0.001 (0.002)	−0.001 (0.000)	−0.002 (0.003)	−0.000 (0.001)
Intergenerational care intensity	−0.001 (0.002)	−0.000 (0.000)	−0.002 (0.002)	−0.000 (0.000)	0.003 (0.002)	0.000 (0.000)	0.003 (0.002)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.001 (0.002)	0.000 (0.000)
Control Variables	×	×	√	√	×	×	√	√	×	×	√	√
Time	√	√	√	√	√	√	√	√	√	√	√	√
Area	√	√	√	√	√	√	√	√	√	√	√	√

Notes: ***, **, * represent significance at the 1%, 5%, and 10% levels, respectively. Bracketed numbers indicate standard error.

Table 6. Results of the sub-residence test of the sample data.

Variable	Model 6-1				Model 6-2			
	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect	Coefficient	Marginal Effect
Medical insurance			0.249 (0.362)	0.031 (0.046)			0.284 (0.318)	0.044 (0.049)
Pension insurance			0.645 * (0.371)	0.081 * (0.047)			0.747 *** (0.254)	0.115 *** (0.039)
Intergenerational care frequency	−0.008 ** (0.004)	−0.001 ** (0.000)	−0.008 ** (0.004)	−0.001 ** (0.000)	−0.006 ** (0.003)	−0.001 ** (0.000)	−0.006 ** (0.003)	−0.001 ** (0.000)
Intergenerational care intensity	0.001 (0.002)	0.000 (0.000)	0.001 (0.002)	0.000 (0.000)	0.002 * (0.001)	0.000 * (0.000)	0.002 * (0.001)	0.000 * (0.000)
Control variables	×	×	×	×	×	×	×	×
Time	✓	✓	✓	✓	✓	✓	✓	✓
Area	✓	✓	✓	✓	✓	✓	✓	✓

Notes: ***, **, * represent significance at the 1%, 5%, and 10% levels, respectively. Bracketed numbers indicate standard error.

3.4. The Effect of the Interaction Terms of Social Security and Intergenerational Care on Elderly Farmers' Cultivated Land Renting Out Behavior

Although elderly farmers with a pension and medical insurance are more likely to choose to rent out their cultivated land, they are also influenced by intergenerational care in practice. At the same time, the influence of intergenerational care on elderly farmers' cultivated land renting out behavior is also influenced by social security. Thus, social security, including its material security and physical health promotion function, and intergenerational care, with its spiritual support function, may interactively influence elderly farmers' renting out behavior. Therefore, we constructed interaction terms for social security and intergenerational care, and added them to the model to perform testing; the estimated results are shown in Table 7.

Table 7. The effect of interaction terms on elderly farmers' cultivated land renting out behavior.

Variable	Logit	
	Coefficient	SE
Pension insurance * Intergenerational care frequency	0.010 **	0.004
Medical insurance * Intergenerational care frequency	−0.009 ***	0.003
Pension insurance * Intergenerational care intensity	0.001	0.002
Medical insurance * Intergenerational care intensity	0.000	0.002

Notes: ***, **, * represent significance at the 1%, 5%, and 10% levels, respectively.

Table 7 shows that none of the interaction terms constructed from intergenerational care intensity and the different variables measuring social security passed the significance test. However, the interaction term of intergenerational care frequency and old-age insurance had a significant positive effect on elderly farmers' cultivated land renting out behavior. This indicates that old-age insurance increases the frequency of intergenerational care among elderly farmers, which in turn increases the likelihood of cultivated land renting out behavior. Hence, Hypothesis 3 was verified. For elderly farmers with old-age insurance, the higher the frequency of intergenerational care, the higher the probability of renting out cultivated land. The relationship between the frequency of intergenerational care and medical insurance was significantly negative, indicating that medical insurance does not increase the frequency of intergenerational care among elderly farmers. In fact, the role of medical insurance is to reduce the burden of medical care and improve the utilization of medical services by elderly farmers, with the aim of improving health, rather than directly

increasing the economic income of elderly farmers; moreover, it does not play a role in material security, which reduces the probability of the adoption of cultivated land renting out behavior by elderly farmers.

4. Discussion

Increasing the motivation of elderly farmers to rent out their cultivated land can achieve a “win-win” situation, as it can not only accelerate the process of agricultural industrialization, but also help increase the income of farmers. The results of this study showed that the motivation of elderly farmers to rent out their cultivated land was not high, and there were large regional differences. This finding was already made by several studies on farmers’ land transfers [32,33]. Although the cultivated land renting out behavior of elderly farmers may be influenced by multiple factors [34], the existence of social security systems contributes to a large extent to this phenomenon; on the other hand, a high frequency of intergenerational care reduces the likelihood that elderly farmers will rent out their arable land.

In encouraging elderly farmers to rent out their cultivated land, it is important to pay attention to their social security, and to how the identified factors affect their cultivated land renting out behavior. In China, the pension system initially covered only urban enterprise employees. With the reform and implementation of pension and preferential agriculture policies, China’s pension insurance system is divided into two categories: urban enterprise employees’ pension insurance and urban and rural residents’ pension insurance. Urban enterprise employees mainly participate in the pension insurance for urban enterprise employees, and urban and rural residents mainly participate in the pension insurance for urban and rural residents. By paying different levels of insurance premiums, rural residents can receive corresponding pensions when they reach the age of 60. In fact, as a key source of old-age security for elderly farmers, social security can realistically and directly affect the old-age life of elderly farmers. The results of this study showed that social security is conducive to increasing the likelihood that elderly farmers will rent out their cultivated land. In particular, pension insurance was found to have made a significant contribution to this behavior. This is generally consistent with the findings of Zhu et al. [35], who emphasized that income from pension insurance can replace the farm income of elderly farmers, reduce the likelihood of their farm labor, and promote cultivated land renting out behavior. Therefore, it can be predicted that improving the rural social security system, and especially increasing the pension insurance benefits of elderly farmers, can help increase the probability of cultivated land renting out behavior. It is noteworthy that among the different variables measuring social security, the effect of medical insurance on the cultivated land renting out behavior of elderly farmers was not found to be significant. The main reason could be that medical insurance does not directly increase income, but indirectly reduces the economic burden of elderly farmers [36]. In order to promote land transfer for older farmers, the European Union (EU) has developed an early retirement scheme for farmers under the Common Agricultural Policy. According to the scheme, only those farmers who have been engaged in agriculture for the past 10 years and have reached the age of 55–65 can participate in the early retirement scheme for farmers [37,38]. The scheme mainly encourages elderly farmers to quit farming and transfer their farmland or farm to young farmers or to other farmers who can help expand the scale of farm operations [39,40]. At the same time, in order to guarantee the life of elderly farmers who retire early, farmers will receive a certain percentage of pension every year after retirement [41]. By implementing early retirement schemes for farmers, EU countries have effectively increased the area of farmland and the overall viability of agriculture, as well as increasing the ambition of young farmers to revitalize farms and improving opportunities for young farmers to use farmland to start businesses. In addition, many EU countries have invested a lot of money in land transfer and agricultural structure optimization, and have enacted and implemented relevant laws and regulations, all of which promote the free flow of land and the scale of land development [42,43]. The farmers’ early retirement scheme and land

transfer measures in EU countries provide important development ideas for advancing social security systems for older farmers in China.

In relation to intergenerational care, the frequency of intergenerational care was found to have a significant negative effect on elderly farmers' cultivated land renting out behavior, while the effect of intergenerational care intensity was insignificant. This result is different from the findings of the majority of previous studies, which suggested that a high frequency of intergenerational care increases the probability of cultivated land renting out behavior, and that intergenerational care has a crowding-out effect on farmers' time spent on cultivated land [44]. The scope of this study included mainly elderly farmers, who have a deep attachment to cultivated land as their basic means of subsistence. On the one hand, because elderly farmers have been engaged in agricultural labor for a long time and have developed the habit of cultivating land, the sudden cessation of labor may frustrate their self-worth, and they will no longer cultivate as finely as they did in their youth, but will tend to plow roughly. On the other hand, when the intergenerational economic support given by their children is not enough for their retirement, elderly farmers dare not give up their land easily to ensure their survival [26], and will be reluctant to rent it out. In other words, if more intergenerational economic support can be obtained in the process of intergenerational care, which is sufficient to support elderly farmers in their old age, elderly farmers will be likely to rent out their arable land; on the other hand, in the case of lower intergenerational economic support, or even in the case of elderly farmers needing to subsidize their children, they will be very unlikely to choose to rent out their arable land.

In this study, control variables such as age, health status, marital status, and farm asset value, were found to have a significant effect on elderly farmers' cultivated land renting out behavior. Elderly farmers with a lower age are more likely to adopt such behavior [45] because they can earn a high income by working in the city or starting a business. In addition, in China's dualistic urban–rural economic structure, the siphon effect of cities attracts a large amount of labor. Families with urban-based workers are more willing to rent out their cultivated land than those living on cultivated land [46]. Moreover, the better the health status of elderly farmers, the higher the probability of renting out cultivated land. This is consistent with the findings of Zhang et al. [47]. In addition, elderly farmers who did not have a spouse living with them were more likely to rent out cultivated land. Li et al. [16] found that elderly farmers who were not married, or did not have a spouse, were more likely to rent out cultivated land. The findings of this study also indicated that elderly farmers with lower farm asset values were more likely to rent out their cultivated land. The higher the quantity of money invested in cultivated land, the greater the time and effort invested in cultivated land, while the greater the dependence on cultivated land security, the lower the probability of cultivated land renting out behavior.

This study also grouped elderly farmers in different regions to assess the effects of social security and intergenerational care on elderly farmers' cultivated land renting out behavior. The results showed that pension insurance and the frequency of intergenerational care had a significant effect on the cultivated land renting out behavior of elderly farmers in the eastern region, while in the western region, this behavior was only affected by pension insurance, and in the central region, it was not affected by these two factors. This finding has never been described before. There are several possible explanations for this result. The higher level of economic development in some cities in the eastern region and the gradual improvement in social security benefits largely increase the probability of renting out cultivated land. In fact, the higher the level of economic development, the higher the number of opportunities to migrate from rural areas to urban areas for work; consequently, the higher the related life stress, the greater the probability that elderly farmers will share the financial stress of their children who migrate to urban areas for work, leading to an increase in the frequency of intergenerational care, while still continuing to keep cultivated land to ensure a higher income.

The results of this study provide some policy insights. First, the government should make full use of TV, Jitterbug, and the Internet to widely publicize the positive role of

cultivated land rental in improving and stabilizing the economic income of elderly farmers, as well as in promoting rural economic development and labor migration. At the same time, the government should also emphasize that cultivated land rental is conducive to improving the rural ecological environment and achieving economic and socio-ecological benefits. Second, it is recommended to further improve the social security system in rural areas, focusing on elderly farmers' pension, medical care, and livelihood, gradually raising the level of treatment of elderly farmers' pension insurance and medical insurance, changing the reliance on land as the main source of pension for elderly farmers, and relieving elderly farmers of their psychological burden and worries. Thirdly, through policy support and incentives, it is recommended to reduce the burden of intergenerational care on elderly farmers. This should be achieved by encouraging the birth of three children per family, improving and optimizing the child care service network, promoting the creation of child care service institutions, promoting the development of socialized child care, and reducing the pressure on families to take care of children. Fourth, it is recommended to improve and optimize the elderly care service system, promote the construction of a three-tier elderly care service network in rural areas, promote the construction of rural happy homes, day care centers, and other elderly care service facilities, promote the development of mutual aid elderly care, and reduce the economic and psychological burden of elderly farmers. Fourth, it is recommended to establish and develop a new type of agricultural business system, enhance the non-farm employment capacity of elderly farmers by expanding non-farm employment opportunities, increase the income avenues of elderly farmers in situ, reduce the worries of old-age security, and promote the effective rental of cultivated land.

5. Conclusions

Using balanced panel data from the China Health and Retirement Longitudinal Study (CHARLS), this study analyzed the effect of social security, intergenerational care, and their interactions on the cultivated land renting out behavior of elderly farmers. This study considered also regional differences in the cultivated land renting out behavior of elderly farmers. After successfully performing tests of the underlying regression results, this study obtained three key conclusions.

First, the overall probability that elderly farmers will choose to rent out their cultivated land is low, and can be effectively increased by reasonable social security and lower intergenerational care. In the social security dimension, pension insurance has a positive effect on the renting out behavior of elderly farmers. Compared to those who did not participate/did not receive pension insurance, those who participated/received pension insurance had a 4.3% higher probability of renting out their cultivated land. In the intergenerational care dimension, the frequency of intergenerational care has a significant negative effect on the adoption of such behavior.

Second, social security and intergenerational care have an interactive effect on elderly farmers' cultivated land renting out behavior. More precisely, the effect of social security on elderly farmers is influenced to some extent by the frequency of intergenerational care, which may stimulate those elderly farmers who have old-age insurance to rent out their cultivated land. The impact of medical insurance on elderly farmers' renting out behavior is also influenced by the frequency of intergenerational care. It is suggested that increasing the level of old-age insurance benefits for elderly farmers will help them meet their daily expenditure needs and increase their well-being, while at the same time encouraging them to rent out their cultivated land.

Third, there are differences in the probability of renting out cultivated land and in the effects of social security and intergenerational care on the rental behavior of elderly farmers in the eastern and central regions of China. In fact, elderly farmers in the western region are more likely to rent out their cultivated land than those in the eastern and central regions. Elderly farmers in the eastern region are mainly influenced by pension insurance

and the frequency of intergenerational care, while those in central and western regions are influenced by medical insurance and pension insurance.

The findings of this study have a number of important implications for the government to improve the rural social security system and strengthen intergenerational mutual support. However, this study also has some limitations. It only investigated the cultivated land renting out behavior of elderly farmers, and did not address that of young adult farmers. In fact, elderly farmers are not representative of all farmers, and there are significant differences between them.

Author Contributions: J.S.: conducted the research and wrote the paper; P.C.: processed the data and wrote the paper; Z.L.: guided the research and did extensive updating of the manuscript. All authors have read and agreed to the published version of the manuscript.

Funding: This study was funded by the National Social Science Fund of China (No. 22BGL189), the Natural Science Foundation of Shandong Province, China (No. ZR2022QG072).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to confidentiality.

Acknowledgments: The authors would like to thank all interview participants for generously giving their time.

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

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