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How Does Land Tenure Security Affect Farm Succession? Evidence from Apple Growers in China

Qiangqiang Zhang 1,2,†, Jiaying Tian 3,4,†, Jie Zheng 5, Nazir Muhammad Abdullahi 2,6 and Xuexi Huo 2,*

1 China Center for Agricultural Policy, School of Advanced Agricultural Sciences, Peking University, Beijing 100871, China; qzhang@nwafu.edu.cn
2 College of Economics and Management, Northwest A&F University, Xianyang 712100, China; abdullahi@nwafu.edu.cn
3 Economic College, Henan University of Science and Technology, Zhengzhou 471000, China; tianjiaying@zzdlgdzkxx19.wecom.work
4 Zhengzhou Electric Power College, Zhengzhou 450000, China
5 School of Insurance and Economics, University of International Business and Economics, Beijing 100029, China; 201930088@uibe.edu.cn
6 School of Rural Technology and Entrepreneurship Development, Kano State Polytechnic, Kano P.M.B 3401, Kano 700222, Nigeria
* Correspondence: xuexihu@nwafu.edu.cn
† These authors contributed equally to this work.

Abstract: The security of farmland property rights is an important factor that affects farmland investment and succession, and farm succession is highly significant for achieving sustainable agricultural development. In this study, based on survey data obtained from 1012 apple growers in Shandong and Shaanxi Provinces, we analyzed the impact of land tenure security on the farm succession willingness of farmers and related paths by constructing binary logistic regression and mediating effect models. The results showed that: (1) land tenure security plays a significant role in promoting the farm succession willingness of farmers; and that (2) land tenure security promotes farm succession willingness by improving the farmland investment intentions of farmers. In the future, reforms of the farmland property rights system need to ensure the security of farmland property rights. In addition, with the influence of climate change, it is necessary to encourage farmers with advantageous agricultural resource endowments to invest in farmland and intergenerational transfers, as well as inducing farmers who lack advantageous agricultural resource endowments to conduct non-agricultural transfers, thereby providing more opportunities and a greater development area for agricultural land transfers and agricultural-scale operations.

Keywords: farm succession; land tenure security; farmland investment; apple grower; China

1. Introduction

As the effects of global climate change expand, sustainable agriculture and revitalization of the countryside are two important factors that can support global sustainable development, and farmland is indispensable for achieving these two goals [1]. However, due to the transfer of rural laborers and the degradation of farmland, the pressure is increasing on the sustainable use of farmland to achieve these two vital goals. In particular, large numbers of young peasant workers have left their home villages to move to cities, and thus the communities left behind by rural job seekers have been weakened in China [2,3]. The fragmented families and children, women, and elderly people in their home villages struggle to sustain small farms, and about 2 million hectares of farmland are abandoned each year [4]. The “farmland inheritance dilemma” has become an increasingly important problem [5–7]. Therefore, farmland investment and succession are playing key roles in improving farmland use efficiency in order to ensure food security and promote the sustainable development of the rural economy in the future [8,9].
The governments of many countries have invested heavily in promoting farm succession and encouraging young farmers to engage in agricultural production, such as the Early Farm Retirement Schemes (EFRS) in Ireland, France, and Greece and the Encourage Successors Programs (ESP) in Brazil [10–13]. Chinese scholars mainly focus their attention on accelerating rural land circulation [14,15] to avoid the disadvantages of an aging agricultural labor force. However, China’s agricultural production is still dominated by scattered small farmers. Due to the low level of education of farmers, imperfect land transfer market, imperfect rural social security system, and low value added of agricultural science and technology, it is difficult to solve the problem of an aging agricultural labor force in a short time through land transfer [16,17]. The practical experience of developed agricultural countries shows that intergenerational transmission based on family farms is an effective way to solve the aging problem of the agricultural labor force; that is, the main body of agricultural management in the future is the offspring born in family farms, and promoting stable and effective intergenerational transmission of family farms is the foundation and guarantee for sustainable agricultural development [18,19].

Agricultural land tenure security (LTS) is a critical issue for the new wave of incentive-based policy instruments that aim to encourage farmland investment and succession and improve the efficiency of farmland use. Moreover, several qualitative and quantitative studies have shown that the main reason for inadequate farmland investment and succession in developing countries is insecure farmland property rights [20–22]. Thus, increased LTS can incentivize farmers to invest more in production factors (such as organic manure, fertilizers, and agricultural machinery) in agriculture [23], especially continuous investment (such as irrigation canal maintenance, soil conservation, and planting green manure) [24], which will increase the productivity and income from agricultural activities [25] and encourage farmland inheritance. However, despite the importance of LTS for farmland investment according to previous studies, some issues regarding the effects of LTS on farm succession require further research. In particular, previous studies mainly investigated the effects of farmland property rights’ security on short-term investment (such as the application of fertilizers and pesticides) or long-term investment (such as irrigation canal maintenance, the application of organic fertilizer, and planting green manure) [26–29], whereas they failed to consider the impact of LTS on sustainable farmland use, particularly on the transfer of farmland between generations in the context of rural China.

According to practical agricultural experience in developed countries, intergenerational family transfers remain the dominant mechanism for farm succession in most western European countries and the USA [5,30,31], and they are regarded as an integral characteristic of the family farm [32]. However, previous studies showed that the insecure farmland property rights weaken the willingness to invest and pass down farmland in developing countries [33]. To address concerns about farm succession, studies investigated the potential successor plans for the heads of farm households or the expectations of young people in rural areas experiencing migration, and tested the impacts of three main categories of variables on the probability of intra-family succession: farm factors (including the farm’s size, profitability, and assets) [34–36], individual characteristics (including age, education, and practical skills) [37–39], and household factors (including the number of family laborers, family background, and comparative income) [18,40,41]. These studies on farm succession provided valuable insights into how the succession outcomes are affected by specific factors or combinations of factors, but they did not consider the impact of LTS on farm succession.

Indeed, in addition to affecting agricultural land investment, LTS may have a significant impact on the destiny of family farms (which depends on the outcome of the farmland succession process) [6,31,34]. Insecure farmland property rights will weaken the incentive for household investment, especially long-term investment, thereby reducing the possibility of farmland inheritance. Therefore, it is important to determine how LTS might interact with farm succession.
Thus, in this study, we considered the impact of LTS on farm succession to complement farm succession research. The overall aim of this study was to examine the effect of the security of farmland property rights on farm succession for households in China. Based on information obtained from 1012 apple growers in Shandong and Shaanxi Provinces, we employed logit and order logit regression models to estimate the effect of the security of farmland property rights on the possibility of farmland succession. The contributions of this study are to investigate the influence mechanism of LTS on farm succession and enrich the research on intergenerational transmission behavior of farmers’ agricultural management.

The remainder of this paper is organized as follows. In Section 2, we explain the changes to agricultural land tenure in China. In Section 3, we present the sampling and data collection methods, variables, and descriptive analysis. In Section 4, we explain the methodology, including the model specification and estimation strategy. In Section 5, we present the empirical results and discussion. We give our conclusions and suggest policy implications in Section 6.

2. Research Background

Explicit and stable farmland property rights are critical for agricultural production [42–44]. Due to the unique land system in China, farmland use management is greatly affected by changes in land use policies [45]. Following the reform and opening up of China in 1978, rural reforms were implemented in the agricultural management system [46–48]. In particular, the reform of the agricultural land system in China started with the affirmation of the household contract responsibility system in the government document of “Several Issues on Further Strengthening and Improving the Agricultural Production Responsibility System” during 1980s, which liberated and developed rural productive forces and led to historic changes in rural socioeconomic development and farmland use management [49,50].

Moreover, the agricultural land contract period was extended to 15 years and 30 years in 1984 and 1993, respectively. In 2008, “Several Major Issues Concerning the Promotion of Rural Reform and Development” emphasized that farmland contractual management rights will remain unchanged for a long time. A new round of pilot work for farmland confirmation was initiated until 2009, with the aim of further stabilizing farmland property rights. China’s “No. 1 central document” for 2013 clearly stated that “it will take 5 years to basically complete the registration and issuance of the right to contractual management of rural land.” [51,52]. Based on the effects of previous land empowerment reforms, the new round of farmland rights confirmation clearly defined the rights to each piece of land for each subject and the use of a property certificate to strengthen the stability of land rights for farmers. A systematic historical review of the land system reform process in China was provided by Zhou et al. [45].

However, greater industrialization and urbanization has led to the increased transfer of young laborers from rural households to urban households in search of non-agricultural jobs that pay relatively higher income [53]. The phenomenon of farmland abandonment has occurred in some rural areas of China to affect the allocation and utilization of farmland resources, thereby influencing the sustainable use of farmland [54]. The new round of farmland rights confirmation aims to strengthen the stability of land rights and reduce the random tax losses of farmers due to land rights issues [20]. Therefore, the stability of land rights will enhance the enthusiasm of farmers regarding agricultural production. In particular, agricultural production is dominated by small farmers, and family farmland management depends mainly on intergenerational transfer [34], so LTS can significantly increase the incentive for farming and enhance the willingness of farmers to invest in agriculture and intergenerational transfers [27].

According to a study by the Food and Agriculture Organization of the United Nations (FAO), LTS is defined as the degree of certainty that a person’s rights to land will be recognized by others and protected in cases of specific challenges [55]. Theoretically, the security of farmland property rights affects farmland investment and use in three ways...
(the assurance effect [56], collateral effect [57], and realizable effect) [26,27] and promotes the intergenerational transfer of farmland.

3. Data, Variables, and Descriptive Analysis

3.1. Sampling and Data Collection

In this study, we used survey data from the National Modern Apple Industry Technology System of the China Agriculture Research System, which comprises a cross-section dataset that we acquired between July and August of 2019. This survey employed multi-stage stratified cluster sampling to obtain a representative sample of 1057 apple households in eight counties across two provinces (Shandong and Shaanxi Provinces) in China. The sampling procedures were as follows. Each province was randomly selected from China’s major apple-producing provinces. Shandong and Shaanxi Provinces were selected. Four sample counties were then selected from each province in a two-step procedure. First, we listed all of the counties in each province in descending order of apple acreage, which is a good predictor of the apple production capacity. Second, four counties in each province were selected from the list using the isometric random sampling method. From each selected county, we randomly selected sample townships and villages. Two townships were selected from each county. Five villages were selected per township according to the same procedure. Finally, we randomly selected 13–14 apple-producing households from each village, and a total of 1057 apple-producing households participated in the questionnaire survey. The reason why Shandong and Shaanxi are selected as sample provinces is that these two provinces are the top two provinces in China’s apple production capacity. In 2021, the apple output in these two provinces was 19.07 million tons, accounting for 48.47% of the total output of the whole country [25]. The apple production in these two provinces can reflect the overall level of the whole country to a certain extent, and the conclusions also have universal reference value.

The majority of the survey respondents were the heads at the household level. We collected rich information by interviewing the village leaders at the village level. The questionnaire survey collected individual characteristics (such as age, education, and planting experience), household characteristics (such as the number of family members and apple laborers, and apple income share), agricultural management characteristics (such as whether the farmland property rights were confirmed and issued, and the farm’s size, assets, and profitability), government support (such as the emphasis and subsidy degree of the government), and village characteristics (such as village terrain, the ratio of non-agricultural laborers, and the number of apple production disasters). Forty-five households were excluded because they were landless households due to land acquisition, or they did not have their own family and lived with their parents in 2018. Finally, we used the information acquired from 1012 apple-producing households in 51 villages in eight countries across two provinces (Figure 1).

3.2. Measurement of the Dependent Variable

Previous studies paid more attention to the parents’ willingness and behavior in agricultural operations [6,34,58,59], and less attention to those of the descendants. Given the cross-sectional characteristic of our survey, we used the intergenerational succession willingness of the farm holders regarding apple management to represent the intergenerational transfer of farmland [60,61]. Because the farm holder is the one who sets the succession plan for a family’s apple business and identifies potential successors, their willingness can, to some extent, reflect the family’s apple orchard succession plan. The apple operators were asked: “Do you want your descendants to inherit your orchards?” (hereinafter referred to as “parental willingness”) and “Are your descendants willing to inherit your orchards?” (hereinafter referred to as “descendant willingness”). Since the expectations of the farm holder and/or children do not always change following farm succession, this statement can be used as a representative of the intergenerational transmission of apple management [58,62]. We assumed that the FSW took a value of 1 when both questions were answered “yes”;
otherwise, the value was 0, because only when the willingness of parents and descendants are the same can intergenerational transmission be implemented smoothly.

![Map of sample provinces and distribution of counties](image-url)

**Figure 1.** Map of sample provinces and distribution of counties. Source: Authors’ own elaboration through ArcGIS 10.7 software (GeoScene Information Technology Co., Ltd., Beijing, China).

3.3. Measurement of Key Independent Variables

Previous studies have shown that the clearly defined farmland property rights measured by a farmland confirmation certificate are highly correlated with the security of farmland property rights, which significantly affects farmland investment and succession [51,63]. According to the official information released by the Ministry of Agriculture and Rural Affairs of the People’s Republic of China, the land titling program (LTP) was mostly completed by the end of 2018 [64]. However, there are still some areas that have not yet issued land confirmation certificates (29.05% of apple growers have not obtained land confirmation certificates in our survey sample), and farmers may think that their land rights are secured only when they obtain land confirmation certificates. In this study, we used “the farmland confirmation certificate” to measure the LTS, where the LTS took a value of 1 when the farmland confirmation certificate was obtained; otherwise, the value was 0. Moreover, we used the farmland investment intention (FII) of farmers to measure farmland investment, where the choices comprised: very low = 1, low = 2, medium = 3, high = 4, and very high = 5.

In addition, other control variables are drawn from the existing literature on land tenure security and farm succession. Specifically, characteristics of individual [37,65,66], households [34,40], apple-producing businesses [67], and government support, as well as village characteristics [68], are employed as control variables in this study, as shown in the bottom half of Table 1.

| Variable                        | Definition                                   | Mean of Obtained Group | Mean of Not-Obtained Group | Mean Difference |
|---------------------------------|----------------------------------------------|------------------------|----------------------------|-----------------|
| Dependent variable              |                                              |                        |                            |                 |
| Farm succession willingness (FSW) | Parental willingness × descendant willingness, Yes = 1; No = 0 | 0.25                   | 0.18                       | 0.07 **         |
| Mediating variable              |                                              |                        |                            |                 |
### Table 1. Cont.

| Variable                                | Definition                                                                 | Mean of Obtained Group | Mean of Not-Obtained Group | Mean Difference |
|-----------------------------------------|---------------------------------------------------------------------------|------------------------|----------------------------|-----------------|
| Farmland investment intention (FII)     | Farmland investment intention of sample farmers, very low = 1; low = 2; medium = 3; high = 4; very high = 5 | 3.29                   | 3.12                       | 0.17 *          |
| Control Variables                       |                                                                           |                        |                            |                 |
| Individual characteristics              |                                                                           |                        |                            |                 |
| Age                                     | Age of the household head (years)                                         | 51.15                  | 56.13                      | −4.98 ***       |
| Education                               | Schooling time of the household head (years)                             | 7.07                   | 6.80                       | 0.27            |
| Planting experience                     | Apple business years of the household head (years)                       | 17.11                  | 18.88                      | −1.77 *         |
| Household characteristics               |                                                                           |                        |                            |                 |
| Apple laborers share                    | The proportion of apple laborers among family members (percent)           | 84.07                  | 82.34                      | 1.73            |
| Apple income share                      | The proportion of apple income over total household income in 2018 (percent)| 52.92                  | 55.64                      | −2.72           |
| Apple areas                             | Apple planting areas in 2018 (mu)                                        | 8.38                   | 9.37                       | −1.00           |
| Physical assets                         | Original value of apple productive assets in 2018 (yuan)                 | 22,495.98              | 26,534.79                  | −4,038.81       |
| Apple benefits                          | Sample farmers’ evaluations of apple benefits, very low = 1; low = 2; medium = 3; high = 4; very high = 5 | 3.13                   | 2.84                       | 0.30 ***        |
| Government support characteristics      | Degree of national or local government emphasis on apple production in sample villages, very small = 1; small = 2; medium = 3; large = 4; very large = 5 | 3.63                   | 3.18                       | 0.45 ***        |
| Government subsidy                      | National or local government subsidy degree for apple production in sample villages, very small = 1; small = 2; medium = 3; large = 4; very large = 5 | 2.39                   | 2.14                       | 0.24 *          |
| Village characteristics                 |                                                                           |                        |                            |                 |
| Village terrain                         | plain = 1; hill = 2; mountain = 3; plateau = 4                           | 3.29                   | 3.09                       | 0.20 ***        |
| Non-agricultural laborers ratio         | Proportion of non-agricultural laborers in sample village in 2018 (percent) | 60.25                  | 59.11                      | 1.15            |
| Apple disasters                         | Number of apple production disasters in sample village in 2018 (times)    | 0.65                   | 0.82                       | −0.17 **        |
| Province variables                      |                                                                           |                        |                            |                 |
| Shandong                                | Shandong = 1; Others = 0                                                  | 0.44                   | 0.50                       | −0.06           |
| Shaanxi                                 | Shaanxi = 1; Others = 0                                                   | 0.56                   | 0.50                       | −0.06           |

Note: The total sample size is 1,012, of which the sample size of the obtained group is 718, and the sample size of the not-obtained group is 294. The mean difference equals the mean of the obtained group minus the mean of the not-obtained group. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. Yuan is a unit of money in China; 1 yuan = 0.1555 U.S. dollars in 2018. Mu is a unit of land size in China; 1 mu = 0.067 hectares. Source: Authors’ own elaboration.

Table 1 shows the definitions and summary statistics for the variables used in this study. It should be noted that the mean value of the FSW for the obtained group was 0.25,
which was higher than that for the not-obtained group, i.e., 0.18. The mean value of FII for farmers in the obtained group was 3.29, which was higher than that for those in the not-obtained group, i.e., 3.12. Moreover, Table 1 also shows that the control variables differed (such as age, planting experience, apple benefits, government support, village terrain, and apple disasters) between these two groups, where the difference in the FSW values for the obtained group and not-obtained group may have been caused by the differences in other control variables rather than the LTS measured, based on the confirmed land rights. Therefore, it was necessary to employ an econometric model for regression analysis to ensure that the research conclusions were valid.

4. Methodology

To estimate the impact of LTS on FSW, and to assess the mediating effect of FII on the impact of LTS on FSW, we constructed the following econometric model.

4.1. Binary Logistic Regression (BLR) Model

The dependent variable in our model was binary, so we used a BLR model to determine the impacts of LTS and FII on FSW. We estimated the following Equation:

\[
P(y_i) = F(\alpha Z + \beta M + \lambda X) = \frac{1}{1 + e^{-(\alpha Z + \beta M + \lambda X)}}
\]

(1)

where \(y_i\) is a dependent variable. We assigned the value of \(y_i\) to be equal to 1 if the \(i\)th household was willing to transfer their apple-producing business between generations; otherwise, the value was 0. \(Z\) is LTS, \(M\) is FII, \(X\) is a vector of the control variables, i.e., individual, household, apple business, government support, and village characteristics, and \(\alpha\), \(\beta\), and \(\lambda\) are the parameters that needed to be estimated. By applying the natural logarithm transformation to Formula (1), we obtained the following linear expression for the BLR model:

\[
y_i = \log \left( \frac{P(y_i = 1|Z, M, X)}{1 - P(y_i = 1|Z, M, X)} \right) = \alpha Z + \beta M + \lambda X + \varepsilon
\]

(2)

where \(\log\) is the logarithm. \(\varepsilon\) is a random disturbance term.

4.2. Mediating Effects Examination Model

Based on the gradual test method of Wen et al. [69], we used the mediating effects examination model to assess the mediating effects of FII on the impact of LTS on FSW:

\[
Y = cZ + \lambda X + e_1
\]

(3)

\[
M = aZ + \lambda X + e_2
\]

(4)

\[
Y = c'Z + bM + \lambda X + e_3
\]

(5)

where \(Y\), \(Z\), \(M\), and \(X\) have the same meaning defined in Formulas (1) and (2), and \(a\), \(b\), \(c\), and \(c'\) are the parameters that need to be estimated. \(e_1\), \(e_2\), and \(e_3\) represent residual terms. The test procedure for the mediating effect was conducted as described by Wen et al. [69].

5. Empirical Results and Discussion

Prior to the logistic regression, we used the variance inflation factor (VIF) to detect multicollinearity. The VIF tests indicated that the maximum VIF was 2.18. Therefore, there was no multicollinearity between the variables.

5.1. Impact of LTS on FSW

A BLR model was constructed to confirm the relationship between LTS and FSW. Table 2 shows the results estimated with the BLR model based on maximum likelihood and robust variance estimation methods. Model 1 is the benchmark model (only including LTS).
After gradually introducing the control variables, Model 3 exhibited a higher predictive capacity and was more appropriate for interpretation, as indicated by the pseudo-R2 value of 0.195 and the smallest AIC (Akaike information criterion) and BIC (Bayesian information criterion). Admittedly, the pseudo-R2 in this paper is still low due to the limitations of the research data, probably because the heterogeneity of plots and the employment status of offspring are not considered, as the output efficiency of plot quality and the dependence of offspring on apple operations affect the willingness to transmit apple operations between generations. Future studies need to include more plot-level and offspring-level variables to improve the predictive capacity of the model.

Table 2. Impact of LTS on FSW.

| Dependent Variable: Farm Succession Willingness (FSW) | Model 1 | Model 2 | Model 3 |
|-------------------------------------------------------|---------|---------|---------|
| Key Independent variable                             |         |         |         |
| Land tenure security (LTS)                            | 0.446 **| 0.0825 ***| 0.589 **|
| Control Variables                                     |         |         |         |
| Age                                                   | 0.369 ***| 0.354 ***| 0.010  |
| Age squared                                           | −0.002 ***| −0.002 ***| 0.028  |
| Education                                             | −0.101 ***| −0.065 **| 0.010  |
| Planting experience                                   | −0.036 ***| −0.009  | 0.010  |
| Family characteristics                                |         |         |         |
| Apple laborers’ share                                 | 0.009 **| 0.006  | 0.005  |
| Apple income share                                    | 0.012 **| 0.010 ***| 0.003  |
| Physical assets (logarithm)                           | 0.225 **| 0.281 ***| 0.104  |
| Apple benefits                                        | 0.291 ***| 0.273 ***| 0.096  |
| Government support characteristics                    |         |         |         |
| Government emphasis                                   | 0.079  | 0.076  | 0.011  |
| Government subsidy                                    | 0.075  | 0.077  | 0.066  |
| Village topography                                    | 0.564 ***| 0.163  |         |
| Non-agricultural laborers ratio                       | −0.011  | −0.315 **| 0.0924 **|
| Apple disasters                                       | −0.11  | 0.006  | 0.132  |
| Shandong                                              | −0.924 **| 0.281  |         |
| Constant term                                         | −1.534 ***| −17.670 ***| −18.716 ***|
| Pseudo R²                                              | 0.004  | 0.143  | 0.195  |
| Likelihood ratio                                       | 4.010 **| 115.020 ***| 138.390 ***|
| Log pseudo likelihood                                 | −485.365 | −417.755 | −392.261 |
| AIC (Akaike information criterion)                    | 974.730 | 857.510 | 818.523 |
| BIC (Bayesian information criterion)                  | 984.570 | 911.626 | 902.158 |

Notes: **, and *** denote statistical significance at the 5% and 1% levels, respectively. “Logarithmic” denotes the natural logarithm of the original value of apple productive assets. “Std. Dev.” denotes robust standard error. Shaanxi is the reference group in the provincial virtual variables. The sample size of each model is 1012. Source: Authors’ own elaboration.

As shown in Table 2, the coefficients for LTS in Models 1, 2, and 3 had positive and statistically significant effects on FSW, thereby suggesting that a retiring apple operator with a confirmed land title was more likely to transfer farmland to their descendants, possibly because the LTS due to the new round of farmland rights confirmation could inspire farmers to be more enthusiastic about farming [20,70], thereby increasing their willingness to pass on farmland management between generations.
Among the control variables, the age of the household head had a positive and statistically significant effect on FSW in the form of an inverse U-shaped relationship. It is possible that the farm management experience and skills represented by age are an indication of farm succession [71], but if the household head delays the farm inheritance plan for too long, they may find it difficult to find a suitable successor to the farm because their offspring can make a living in other ways [19,72]. The coefficient of the education level of the household head was negative and statistically significant for FSW, which suggests that a household head with higher education has more opportunities to engage in non-agricultural work [6]. The apple income shares and benefits had positive and statistically significant effects on FSW, thereby demonstrating that the economic profits of apple farms are crucial for determining whether a successor is interested in taking over apple management. Thus, more profitable apple orchards are likely to attract potential successors [41,73]. Respondents with more physical assets were more willing to pass on their apple orchards to subsequent generations. This result is consistent with that reported by Pessotto et al. [40], who found that small-scale farmers with better infrastructure would be more likely to expect farm succession. The natural conditions reflected by the village terrain and the frequency of apple production disasters had significant impacts on the intergenerational transfer of apple management, which suggests that due to the natural attributes of apples, suitable climatic conditions are fundamental for the survival of apple production by families [18,74].

5.2. Mediating Effects of FII on the Impact of LTS on FSW

Model 4 in Table 3 shows that LTS had a positive and statistically significant effect on FII (coefficient = 0.364, \( p \leq 0.10 \)). The marginal effect of LTS suggests that the farmers with a farmland confirmation certificate in a Chinese rural household are more willing to invest in farmland.

Table 3. Mediating effect of LTS on FSW.

| Dependent Variable: Farmland Investment Intention (FII) | Dependent Variable: Farm Succession Willingness (FSW) |
|--------------------------------------------------------|--------------------------------------------------------|
| Model 4 | Model 5 |
| Coefficient | Std. Dev. | Coefficient | Std. Dev. |
| Land tenure security (LTS) | 0.364 * | 0.201 | 0.461 | 0.290 |
| Farmland investment intention (FII) | | | 0.269 ** | 0.115 |
| Constant term | | | -19.564 *** | 3.496 |
| Control variables | Yes | Yes |
| Pseudo R² | 0.075 | 0.201 |
| Likelihood ratio | 154.710 *** | 144.290 *** |
| Log pseudo likelihood | -1107.447 | -389.573 |

Notes: *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. “Yes” denotes that control variables have been controlled. “Std. Dev.” denotes robust standard errors. The sample size of each model is 1012. Source: Authors’ own elaboration.

Based on the results in Tables 2 and 3, we examined the mediating effect of FII on the impact of LTS on FSW. It should be noted that FII could significantly improve FSW (coefficient = 0.269, \( p \leq 0.05 \)), and thus FSW increased as FII increased. However, the coefficient for LTS in Model 5 was not statistically significant, which suggests that FII had a full mediating role in the impact of LTS on FSW. These findings are consistent with the fact that LTS affected FSW by influencing FII, thereby validating the theoretical analysis model.

6. Conclusions and Implications

In this study, we used a BLR model and mediating effect model to estimate the impact of LTS on FSW and to examine the mediating effect of FII on the impact of LTS on FSW by using data from 1012 apple farming households in Shandong and Shaanxi Provinces, China.
We found that LTS promoted FSW by improving FII, and FII had a full role in mediating the impact of LTS on FSW.

The security of farmland property rights affects farmland succession by incentivizing investment. Farmers may consider farmland succession as a long-term investment in agricultural production. An increase in LTS can reduce the expected losses of farmers due to random agricultural taxes and ensure the stability of their incomes from farming, thereby increasing the willingness of farmers to pass their farmland to subsequent generations.

The empirical results obtained in this study have profound policy implications. The improved security of land rights caused by the agricultural land rights confirmation policy will encourage farmers to invest in farmland and intergenerational succession, which can help to alleviate the general concern in China about “who will farm the land in the future”. The continued reform of the agricultural land system in China has effectively curbed the risk of rural households losing their land due to insecure land rights. Thus, intergenerational transmission has been encouraged by enhancing the security of land rights and increasing the willingness of farmers to invest in farmland. Therefore, it is necessary to continue the reform of the farmland property rights system to ensure security, to encourage farmers with advantageous agricultural resource endowments to invest in farmland and intergenerational transfer, and to induce farmers who lack advantageous agricultural resource endowments to conduct non-agricultural transfers, thereby providing more opportunities and a greater development capacity for agricultural land transfers and agricultural-scale operations.

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References
1. Food and Agriculture Organization of the United Nations (FAO). A New Approach for Mainstreaming Sustainable Food and Agriculture in the Implementation of the Sustainable Development Goals; Food and Agriculture Organization of the United Nations: Rome, Italy, 2019.
2. Corsi, A.; Salvioni, C. Once part-timer always part-timer? Causes for persistence in off farm work state of farmers. Bio-Based Appl. Econ. 2017, 6, 159–182.
3. Morais, M.; Binotto, E.; Borges, J.A.R. Identifying beliefs underlying successors’ intention to take over the farm. Land Use Policy 2017, 68, 48–58. [CrossRef]
4. Liu, Y.; Li, Y. Revitalize the world’s countryside. Nature 2017, 547, 275–277. [CrossRef] [PubMed]
5. Ingram, J.; Kirwan, J. Matching new entrants and retiring farmers through farm joint ventures: Insights from the Fresh Start Initiative in Cornwall, UK. Land Use Policy 2011, 28, 917–927. [CrossRef]
6. Foguesatto, C.R.; Mores, G.d.V.; Dalmutt Kruger, S.; Costa, C. Will I have a potential successor? Factors influencing family farming succession in Brazil. Land Use Policy 2020, 97, 104643. [CrossRef]
7. Usman, M.; Sawaya, A.; Igarashi, M.; Gayman, J.J.; Dixit, R. Strained agricultural farming under the stress of youths’ career selection tendencies: A case study from Hokkaido (Japan). Humanit. Soc. Sci. Commun. 2021, 8, 1–8. [CrossRef]
8. Ma, X.; Heerink, N.; van Ierland, E.; van den Berg, M.; Shi, X. Land tenure security and land investments in Northwest China. China Agric. Econ. Rev. 2013, 5, 281–307. [CrossRef]
9. Maunganidze, L.; Dzingirai, V. Succession planning and the sustainability of the land reform programme in Zimbabwe. J. Asian Afr. Stud. 2021. [CrossRef]
10. Zagata, L.; Sutherland, L.A. Deconstructing the ‘young farmer problem in Europe’: Towards a research agenda. J. Rural. Stud. 2015, 38, 39–51. [CrossRef]
11. Leonard, B.; Kinsella, A.; O’Donoghue, C.; Farrell, M.; Mahon, M. Policy drivers of farm succession and inheritance. Land Use Policy 2017, 61, 147–159. [CrossRef]
12. Valliant, J.C.D.; Ruhf, K.Z.; Gibson, K.D.; Brooks, J.R.; Farmer, J.R. Fostering farm transfers from farm owners to unrelated, new farmers: A qualitative assessment of farm link services. Land Use Policy 2019, 86, 438–447. [CrossRef]
13. European Commission. Key Policy Objectives of the Future CAP. 2022. Available online: https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/future-cap/key-policy-objectives-future-cap_en#nineobjectives (accessed on 1 June 2022).
14. Han, J.; Liu, S.; Zhang, S.; Liu, Y. Influence of aging of agricultural labor force on large-scale management of land. Resour. Sci. 2019, 41, 2284–2295. [CrossRef]
15. Huang, Y.; Hui, E.C.M.; Zhou, J.; Lang, W.; Chen, T.; Li, X. Rural revitalization in China: Land-use optimization through the practice of place-making. Land Use Policy 2020, 97, 104788. [CrossRef]
16. Liu, G.; Wang, H.; Cheng, Y.; Zheng, B.; Lu, Z. The impact of rural out-migration on arable land use intensity: Evidence from mountain areas in Guangdong, China. Land Use Policy 2016, 59, 569–579. [CrossRef]
17. Yan, J.; Yang, Y.; Xia, F. Subjective land ownership and the endowment effect in land markets: A case study of the farmland “three rights separation” reform in China. Land Use Policy 2021, 101, 105137. [CrossRef]
18. Daniele, C.; Danilo, B.; Federico, T.; Dario Gianfranco, F. What factors encourage intrafamily farm succession in mountain areas? Mt. Res. Dev. 2015, 35, 152–160.
19. Sheridan, A.; Newsome, L.; Howard, T.; Lawson, A.; Saunders, S. Intergenerational farm succession: How does gender fit? Land Use Policy 2021, 109, 105612. [CrossRef]
20. Besley, T. Property rights and investment incentives: Theory and evidence from Ghana. J. Political Econ. 1995, 103, 903–937. [CrossRef]
21. Cao, Y.; Bai, Y.; Zhang, L. The impact of farmland property rights security on the farmland investment in rural China. Land Use Policy 2020, 97, 104736. [CrossRef]
22. Vu, H.T.; Goto, D. Does awareness about land tenure security (LTS) increase investments in agriculture? Evidence from rural households in Vietnam. Land Use Policy 2020, 97, 104721. [CrossRef]
23. Gao, L.; Sun, D.; Huang, J. Impact of land tenure policy on agricultural investments in China: Evidence from a panel data study. China Econ. Rev. 2017, 45, 244–252. [CrossRef]
24. Akram, N.; Akram, M.W.; Wang, H.; Mehmood, A. Does land tenure systems affect sustainable agricultural development? Sustainability 2019, 11, 3925. [CrossRef]
25. National Modern Apple Industry Technology System (NMAITS). Annual Report on Economic Development of Apple Industry in 2021; Northwest A&F University: Xianyang, China, 2022.
26. Deininger, K.; Jin, S. Tenure security and land-related investment: Evidence from Ethiopia. Eur. Econ. Rev. 2006, 50, 1245–1277. [CrossRef]
27. Ma, X.; Heerink, N.; Feng, S.; Shi, X. Farmland tenure in China: Comparing legal, actual and perceived security. Land Use Policy 2015, 42, 293–306. [CrossRef]
28. Jiao, N. Does land tenure security change farmer’s investment behavior? Evidence from 2011/2013 CHARLS. J. Agrotech. Econ. 2018, 42–53. (In Chinese)
29. Uchezuba, D.; Amaambo, P.; Mbai, S. Tenure security, investment and the productivity of agricultural farms in the communal area of Kavango West Region of Namibia: Any evidence of causality. Afr. J. Agric. Res. 2019, 14, 1114–1128. [CrossRef]
30. Fischer, H.; Burton, R.J.F. Understanding farm succession as socially constructed endogenous cycles. Sociol. Rural. 2014, 54, 417–438. [CrossRef]
31. Burton, R.J.F.; Fischer, H. The succession crisis in European agriculture. Sociol. Rural. 2015, 55, 155–166. [CrossRef]
32. Chiswell, H.M. From generation to generation: Changing dimensions of intergenerational farm transfer. Sociol. Rural. 2018, 58, 104–125. [CrossRef]
33. Ji, X.; Liu, S.; Yan, J.; Li, Y. Does security of land operational rights matter for the improvement of agricultural production efficiency under the collective ownership in China? China World Econ. 2021, 29, 87–108. [CrossRef]
34. Bertoni, D.; Cavicchioli, D. Farm succession, occupational choice and farm adaptation at the rural-urban interface: The case of Italian horticultural farms. Land Use Policy 2016, 57, 739–748. [CrossRef]
35. Bertolozzi-Caredio, D.; Bardaji, I.; Coopmans, I.; Soriano, B.; Garrido, A. Key steps and dynamics of family farm succession in marginal extensive livestock farming. J. Rural. Stud. 2020, 76, 131–141. [CrossRef]
36. Janssuwan, P.; Zander, K.K. What to do with the farmland? Coping with ageing in rural Thailand. J. Rural. Stud. 2021, 81, 37–46. [CrossRef]
37. Bednářková, Z.; Bavorová, M.; Ponkina, E.V. Migration motivation of agriculturally educated rural youth: The case of Russian Siberia. J. Rural. Stud. 2016, 45, 99–111. [CrossRef]
38. May, D.; Arancibia, S.; Behrendt, K.; Adams, J. Preventing young farmers from leaving the farm: Investigating the effectiveness of the young farmer payment using a behavioural approach. Land Use Policy 2019, 82, 317–327. [CrossRef]
39. Arends-Kuening, M.; Kamei, A.; Garcias, M.; Romani, G.E.; Assis Shikida, P.F. Gender, education, and farm succession in Western Paraná State, Brazil. Land Use Policy 2021, 107, 105453. [CrossRef]
40. Pessotto, A.P.; Costa, C.; Schwinghamer, T.; Colle, G.; Corte, V.D.F. Factors influencing intergenerational succession in family farm businesses in Brazil. Land Use Policy 2019, 87, 104045. [CrossRef]
41. Corsi, A.; Frontuto, V.; Novelli, S. What drives farm structural change? An analysis of economic, demographic and succession factors. Agriculture 2021, 11, 438. [CrossRef]
42. Alchian, A.A.; Demsetz, H. The property right paradigm. J. Econ. Hist. 1973, 33, 16–27. [CrossRef]
43. Adamopoulos, T.; Restuccia, D. Land reform and productivity: A quantitative analysis with micro data. Am. Econ. J. Macroecon. 2020, 12, 1–39. [CrossRef]
44. USDA Economic Research Service. Farmland Ownership and Tenure; USDA: Washington, DC, USA, 2020.
45. Zhou, Y.; Li, X.; Liu, Y. Land use change and driving factors in rural China during the period 1995–2015. Land Use Policy 2020, 99, 105048. [CrossRef]
46. Jian, S. Reforms and Open Policy in China. Science 1985, 229, 525–527. [CrossRef] [PubMed]
47. Yuan, X.; Du, W.; Wei, X.; Ying, Y.; Shao, Y.; Hou, R. Quantitative analysis of research on China’s land transfer system. Land Use Policy 2018, 74, 301–308. [CrossRef]
48. Lu, Y.; Zhang, Y.; Cao, X.; Wang, C.; Wang, Y.; Zhang, M.; Ferrier, R.C.; Jenkins, A.; Yuan, J.; Bailey, M.J.; et al. Forty years of reform and opening up: China’s progress toward a sustainable path. Sci. Adv. 2019, 5, eaau9413. [CrossRef]
49. Liu, S. The structure and changes of China’s land system. China Agric. Econ. Rev. 2019, 11, 471–488. [CrossRef]
50. Lai, Z.; Chen, M.; Liu, T. Changes in and prospects for cultivated land use since the reform and opening up in China. Land Use Policy 2020, 97, 104781. [CrossRef]
51. Hong, W.; Luo, B.; Hu, X. Land titling, land reallocation experience, and investment incentives: Evidence from rural China. Land Use Policy 2020, 90, 104271. [CrossRef]
52. Li, J.; Zhang, C.; Mi, Y. Land titling and internal migration: Evidence from China. Land Use Policy. 2021, 111, 105763. [CrossRef]
53. Wang, X.; Huang, J.; Rozelle, S. Off-farm employment and agricultural specialization in China. China Econ. Rev. 2017, 42, 155–165. [CrossRef]
54. Zhang, Y.; Li, X.; Song, W. Determinants of cropland abandonment at the parcel, household and village levels in mountain areas of China: A multi-level analysis. Land Use Policy 2014, 41, 186–192. [CrossRef]
55. Food and Agriculture Organization of the United Nations (FAO). Land Tenure and Rural Development; Food and Agriculture Organization of the United Nations: Rome, Italy, 2002.
56. Beekman, G.; Bulte, E.H. Social norms, tenure security and soil conservation: Evidence from Burundi. Agric. Syst. 2012, 108, 50–63. [CrossRef]
57. Brasselle, A.S.; Gaspart, F.; Plateau, J.P. Land tenure security and investment incentives: Puzzling evidence from Burkina Faso. J. Dev. Econ. 2002, 67, 373–418. [CrossRef]
58. Cavicchioli, D.; Bertoni, D.; Pretolani, R. Farm succession at a crossroads: The interaction among farm characteristics, labour market conditions, and gender and birth order effects. J. Rural. Stud. 2018, 61, 73–83. [CrossRef]
59. Leonard, B.; Farrell, M.; Mahon, M.; Kinsella, A.; O’Donoghue, C. Risky (farm) business: Perceptions of economic risk in farm succession and inheritance. J. Rural. Stud. 2020, 75, 57–69. [CrossRef]
60. Cassidy, A. Female successors in Irish family farming: Four pathways to farm transfer. Can. J. Dev. Stud./Rev. Can. D’Études Du Développement 2019, 40, 238–253. [CrossRef]
61. Shahzad, M.A.; Abubakr, S.; Fischer, C. Factors affecting farm succession and occupational choices of nominated farm successors in Gilgit-Baltistan, Pakistan. Agriculture 2021, 11, 1203. [CrossRef]
62. Inwood, S.M.; Sharp, J.S. Farm persistence and adaptation at the rural–urban interface: Succession and farm adjustment. J. Rural. Stud. 2012, 28, 107–117. [CrossRef]
63. Abdulai, A.; Owusu, V.; Goetz, R. Land tenure differences and investment in land improvement measures: Theoretical and empirical analyses. J. Dev. Econ. 2011, 96, 66–78. [CrossRef]
64. Cheng, W.; Xu, Y.; Zhou, N.; He, Z.; Zhang, L. How did land titling affect China’s rural land rental market? Size, composition and efficiency. Land Use Policy 2019, 82, 609–619. [CrossRef]
65. Coopmans, I.; Dessein, J.; Accatino, F.; Antonioli, F.; Bertolozzi-Caredio, D.; Gavriluscu, C.; Gradziulk, P.; Manevska-Tasevska, G.; Meuwissen, M.; Peneva, M.; et al. Understanding farm generational renewal and its influencing factors in Europe. J. Rural. Stud. 2021, 86, 398–409. [CrossRef]
66. Väre, M.; Pietola, K.; Weiss, C. The irrelevance of stated plans in predicting farm successions in Finland. Agric. Food Sci. 2010, 19, 81–95. [CrossRef]
67. Abdulai, A.; Owusu, V.; Goetz, R. The interaction among farm characteristics, labour market conditions, and gender and birth order effects. J. Rural. Stud. 2018, 61, 73–83. [CrossRef]
68. Cheng, W.; Xu, Y.; Zhou, N.; He, Z.; Zhang, L. How did land titling affect China’s rural land rental market? Size, composition and efficiency. Land Use Policy 2019, 82, 609–619. [CrossRef]
69. Cassidy, A. Female successors in Irish family farming: Four pathways to farm transfer. Can. J. Dev. Stud./Rev. Can. D’Études Du Développement 2019, 40, 238–253. [CrossRef]
70. Shahzad, M.A.; Abubakr, S.; Fischer, C. Factors affecting farm succession and occupational choices of nominated farm successors in Gilgit-Baltistan, Pakistan. Agriculture 2021, 11, 1203. [CrossRef]
71. Inwood, S.M.; Sharp, J.S. Farm persistence and adaptation at the rural–urban interface: Succession and farm adjustment. J. Rural. Stud. 2012, 28, 107–117. [CrossRef]
72. Zhang, Q.; Huo, X. Intergenerational transmission of willingness of apple management for apple growers in Shandong and Shaanxi. J. Arid. Land Resour. Environ. 2021, 35, 52–57. (In Chinese)
71. Suess-Reyes, J.; Fuetsch, E. The future of family farming: A literature review on innovative, sustainable and succession-oriented strategies. *J. Rural. Stud.* 2016, 47, 117–140. [CrossRef]

72. Lange, K.Y.; Johnson, J.W.; Johnson, P.N.; Hudson, D.; Wang, C.; Gustafson, A.W. Intergenerational transfers of managerial control in U.S. family farm businesses. *Am. J. Exp. Agric.* 2015, 9, 20808. [CrossRef]

73. Rech, L.R.; Binotto, E.; Cremon, T.; Bunsit, T. What are the options for farm succession? Models for farm business continuity. *J. Rural. Stud.* 2021, 88, 272–278. [CrossRef]

74. Admasu, T.G.; Jenberu, A.A. The impacts of apple-based agroforestry practices on the livelihoods of smallholder farmers in Southern Ethiopia. *Trees For. People* 2022, 7, 100205. [CrossRef]