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Exploring the impact of the new round of farmland certification on rural household consumption: empirical evidence from China

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Improving the consumption level and optimizing the consumption structure of rural households are the major strategic requirements for building a new development pattern. Farmland certification as the most important institutional arrangement for empowerment and strengthening capabilities is a crucial engine for tapping rural consumption potential, which will have a positive impact on global economic growth. Based on the two periods of unbalanced panel data from the 2017–2019 China Rural Household Panel Survey (CRHPS), this paper empirically investigates the impact of the new round of farmland certification on rural household consumption by using the panel two-way fixed effect model. The results show that: Farmland certification not only fosters the optimization of farmland resources through promoting farmland transfer-out, but also serves to enhance long-term investment in farmland, thereby bolstering the “asset effects” and “wealth effects” for rural households, and ultimately positively affecting their consumption level and structure. Furthermore, from the perspective of the heterogeneous effects of farmland certification on consumption, it affects the secondary-occupation rural households and the second-generation farmers more than the part-time rural households and the first-generation farmers; the impact in the eastern region surpasses that in the central and western regions; and the group with high incomes exceeds that of middle and low-income individuals. Therefore, it is necessary to explore the consumption effect of property rights protection, and adopt appropriate policies for different farmers to improve their consumption.

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Introduction

Consumption is not only an important engine to promote sustainable economic development, but also a direct reflection of people's needs for a better life (Routray and Maheswar 1995; Zhou 2024). Currently, China's economy is transitioning from rapid to moderate growth, and how to effectively stimulate the consumption demand of residents has increasingly become the key to China's transformation of economic development mode (Adamopoulos and Restuecia 2020; Feng et al. 2024). However, relevant research data shows that the consumption rate of Chinese residents will only be 38.79% in 2019, far lower than the world average of 56.90%. In terms of urban and rural consumption, China's rural permanent population accounts for 39.4% of the total population, while the total rural consumption accounts for 21.67% of the total national consumption (Zhao and Chen 2024). In this regard, the No. 1 Document of the China Central Committee in 2021 clearly pointed out that "to build a new development pattern, the potential aftereffect lies in 'agriculture, rural areas and farmers', and there is an urgent need to expand rural demand and smooth the urban-rural economic cycle". This reveals the important potential of rural consumption in economic development (Alston et al. 1996; Yami and Snyder 2016). However, in addition to the weak point of consumption in the urban-rural economic cycle (Cao et al. 2023), there is also a problem of insufficient land use in rural areas, especially with regards to abandoned contracted land (Deiningner and Jin 2006; Luo and Moiwo 2022).

Land has long been an important resource for small farmers to survive in China (Hu and Liu 2024). However, the incomplete and unstable farmland property rights lead to high transaction costs in farmland transfer, which has become a significant feature of China's farmland system arrangement. Although the Chinese government has been trying to strengthen rural households' right to farmland contractual management, rural households' contracted land has not yet completed the universal definition of the right, especially without clear legal expression of its spatial and property attributes (Zhuo et al. 2015). Due to the unclear land property rights, problems such as land fragmentation and low efficiency of land use have emerged (Pu et al. 2024), this is also detrimental to the increase of rural income and the optimization of consumption structure (Zhu et al. 2022; Cheng et al. 2024). Therefore, establishing an effective land property rights system not only protects the land rights of rural households, but also contributes to the rational allocation of rural resources (Subramanian and Kumar 2024).

Owing to the promotion of practice and theory, the Chinese government has made sustained efforts to reform the land property rights system, such as limiting land adjustment, extending the term of land contracts, etc. Notably, the most important thing is to carry out a new round of farmland certification nationwide to realize the exclusive farmland property rights. The latest cycle of farmland certification, initiated in 2013, clearly defines the ownership and physical boundaries of each piece of arable land, granting farmers property rights certificates that have both economic and legal effects. This policy protects rural households' residual control rights and residual claim rights, but also lays a solid institutional foundation for enhancing the stability of farmland property rights (Su et al. 2023).

Nowadays, some scholars have long been concerned about the impact of farmland certification on rural household consumption. When discussing the social security and unemployment insurance functions of China's farmland system, Yao (2000) believed that the long-term farmland ownership might change the consumption and accumulation mode of rural households. Geng et al. (2021) used the panel data of 2014 and 2016 China Labor Dynamic Survey (CLDS) and showed that farmland certification

significantly promoted rural household per capita consumption and per capita commodity consumption, but had no clear impact on per capita service consumption. Kemper et al. (2015) also found that strengthening farmland property rights could affect the consumption level of rural households and the fluctuation of consumption in Vietnam during the transition period from socialist economy to market economy. Moreover, Solomon and Kijima (2022) emphasized that the strengthening of farmland property rights could effectively reduce the negative impact of weather shocks on rural household grain consumption in Ethiopia. Although the aforementioned results have laid the groundwork for this research, there yet remains a relatively vast realm for additional exploration.

This paper is innovative in the following aspects: Firstly, existing literature mainly uses cross-sectional data from a specific region to confirm farmland certification, and few scholars duly identify a new round of farmland certification. By referring to existing literature and using the stability of farmland property rights to characterize farmland certification, combined with the distinction of the implementation time of farmland certification in policy documents, we can more accurately identify the policy effects of a new round of farmland certification, by employing the panel data of the China Rural Household Panel Survey (CRHPS), rather than estimating the overall impact of cross-sectional data, and conduct a series of robustness tests to make the estimation results more reliable. Secondly, most existing literature focuses on the influence of farmland certification on the consumption levels of rural households, yet consumption is mainly composed of consumption level and consumption structure (Yin 2007), hence we also discuss the impact of farmland certification on the consumption structure of rural households. Thirdly, several investigations have primarily focused on the immediate impact of farmland certification on rural household consumption. We delve further into the intrinsic mechanisms by which farmland certification impacts the consumption of rural households, and conduct a heterogeneous analysis, thus providing better empirical evidence for enhancing the purchasing power of the rural households. Fourthly, the impact of China's farmland certification on rural households' consumption is not only of great significance at home, but also provides valuable experience and enlightenment for other developing countries, which is helpful to promote the development and reform of the global rural economy. By learning from China's experience, other developing countries can better design and implement land policies suitable for their national conditions, which will help to further release their rural consumption.

The rest of the paper is structured as follows: The "Analytical framework" section presents the analysis framework; the "Research design" section describes the data sources, variable selection and model construction; the "Empirical results" section presents the empirical analysis; the "Heterogeneity analysis" part is heterogeneity analysis; finally, this paper summarizes the research conclusions and puts forward some policy recommendations.

Analytical framework

The comprehensive impact of farmland certification on rural household consumption. Consumption encompasses the level of consumption and the structure of consumption (Yin 2007), the former reflects the actual satisfaction level of consumers' material and cultural needs, the latter refers to the proportion relationship between various consumer goods within a certain period. Albert and Franco (1963) emphasized that assets and the income have a significant impact on consumption, which is manifested through

two aspects: The “asset effect” and the “wealth effect”. Firstly, according to the life-cycle hypothesis theory, rural households will allocate their lifetime income and assets equally to each stage of the life cycle for consumption. The more assets rural households possess, the higher their consumption level, and the more optimized their consumption structure. This growth effect is termed the “asset effect” (Cao et al. 2023; Xu et al. 2024). Secondly, based on the permanent income hypothesis theory, the increase in asset prices can promote the increase in the wealth stock of rural households, thereby affecting their consumption, that is, the “wealth effect” (Martinez-Oviedo and Medda 2017).

The consumption behavior of rural households possesses unique institutional implications, with a clear correlation between stable farmland property rights and the consumption behavior of rural households (Geng et al. 2021). In theory, the essence of farmland certification is the definition of property rights, which is regarded as the most crucial institutional arrangement for “empowerment and strengthening capabilities” (Min et al. 2024). On one hand, the “empowerment” approach bolsters the rural households’ title to the farmland, thereby liberalizing their rights to till and manage it. On the other hand, the “strengthening capabilities” approach solidifies the farmland rights of rural households, enhances farmland exclusivity, stabilizes rural households’ expectations, guides their long-term investment and production behaviors, optimizes resource allocation, improves agricultural production efficiency, and achieves higher agricultural production income (Li and Huo 2021). The new round of farmland certification requires issuing legally valid property rights certificates to rural households, based on a clear definition of cultivated land’s physical and ownership boundaries, which enhances the stability of farmland property rights (Su et al. 2023). Therefore, the new round of farmland certification, characterized by enhancing farmland property rights, may increase rural households’ consumption.

Further, the mechanism of the impact of farmland certification on consumption can be categorized into the following two aspects: Firstly, farmland certification enhances rural households’ consumption by optimizing the allocation of farmland resources. Once farmland is solidified through titling, the stability of farmland property rights will be strengthened, enhancing the protection of rural households’ farmland management rights, especially the legal protection of the proceeds from the transfer-out of rural households’ farmland. At the same time, rural households’ ability to exclude others from their farmland, their ability to negotiate, and their ability to trade will also be correspondingly enhanced. They can dispose of the contracting rights to their farmland freely within the scope permitted by law (Wan et al. 2023). Consequently, farmers with comparative advantage in non-agricultural employment tend to transfer out farmland, not only to earn higher wage income, but also to generate rental income from farmland (Si et al. 2021). While the new round of farmland certification reform promotes a clearer property relationship, it frees non-agricultural employed labor from the constraints of farmland through improving the efficiency of farmland resource allocation, enabling them to earn more substantial non-agricultural employment income, thereby bringing about the “asset effect”; and it also further activates the attribute of farmland property, promoting the depersonalization of farmland transfer-out and generating the “wealth effect” (Cao et al. 2023), which may then affect rural households’ consumption (Hao and Tang 2023).

Secondly, farmland certification enhances rural households’ consumption through incentives provided by farmland property rights. With unstable farmland property rights, rural households often need to spend more time, money, and resources to protect their farmland property rights. Against the backdrop of non-

agricultural income generally being higher than agricultural income, it is difficult to incentivize rural households to improve the efficiency of farmland use (Liu and Zhang 2024). Fortunately, the new round of farmland certification can enhance the stability of farmland property rights, increase rural households’ confidence in the protection of farmland rights, strengthen the long-term investment incentives, improve expenditure on irrigation facilities (Zheng 2024), thereby improving agricultural production efficiency and increasing agricultural income, leading to a “asset effect” that may potentially affect rural household consumption (Hao and Tang 2023).

The new round of farmland certification, by issuing land property rights certificates with multiple economic uses and mandatory legal effect to rural households, can not only promote the allocation of farmland resources, but also allow rural households to safely transfer out their farmland. This can not only generate farmland rental income, but also earn more non-agricultural income through non-agricultural employment. Moreover, it can increase investment incentives for farmland, allowing rural households to increase long-term investment in marginal farmland, further improving irrigation facilities for farmland, thereby improving agricultural production efficiency and increasing agricultural production income. At the same time, the “mental accounting” theory holds that rural households can allocate different incomes to different accounts, which cannot be filled with each other, and rural households have different consumption preferences for different sources of income (Lou et al. 2024). The enrichment of the income structure of rural households essentially divides their overall income into numerous units, which will greatly enhance their perception of subjective wealth increase (Hong and Lou 2022). Therefore, the change in income structure brought about by the farmland certification can stimulate the consumption of rural households who have both rental income, non-agricultural employment income, and increased agricultural production income due to the increase in agricultural productivity (Geng et al. 2021). Of course, as a reflection of the level of rural households’ needs and the order of demand satisfaction, survival-oriented consumption is dominated by rural households’ physiological requirements, while development-oriented and enjoyment-oriented consumption is driven by rural households’ pursuit of performance and convenience needs, as well as their pursuit of personal development and enjoyment needs (Wang et al. 2021). Rural households have been given a more diversified income structure and a perception of an increase in their subjective income level through the farmland certification. As a result, they are gradually reducing their survival-oriented consumption to meet their physiological needs, while increasing their spending on goods and services that meet their performance needs and personal development needs (Li et al. 2012). However, it should be clear that the purpose of farmland certification is to strengthen the expectation of rural households to realize the true income from the transformation of farmland functions on the basis of clearly defined property rights, but it is not the real increase in rural households’ income in the true sense (Zheng and Qian 2022). Therefore, farmland certification may not have a significant impact on the higher-level convenience needs of rural households and the increase in individual enjoyment-oriented consumption needs (Si et al. 2021). Therefore, this paper believes that the new round of farmland confirmation is helpful to optimize the consumption structure of rural households as a whole¹.

The heterogeneous impact of farmland certification on rural household consumption. Owing to the differences in part-time employment, intergenerational differences, different regional

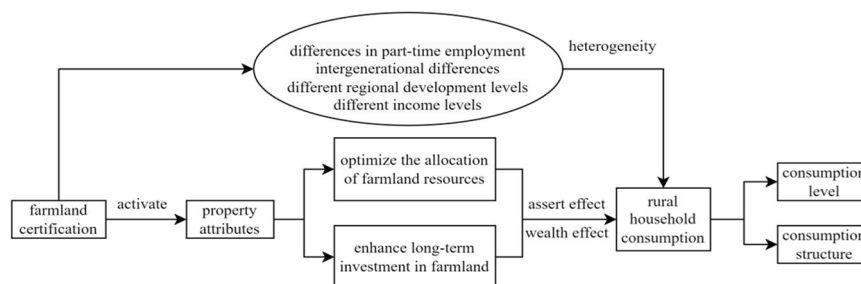


Fig. 1 The analytical framework of farmland certification on rural household consumption. Source: Organized by the authors.

development and income levels, the extent of the impact of farmland certification on rural household consumption may exhibit certain heterogeneity characteristics.

With the deepening of industrialization and urbanization, horizontal differentiation and vertical intergenerational differences of rural households have become two of the most prominent social phenomena at present (Zheng 2024). On the one hand, the increase in non-agricultural employment opportunities has diversified the vocational choices of rural households and their resulting income, leading to a continuous weakening of the farmland's subsistence security function. The livelihood pattern rooted in the farmland and centered on agriculture is gradually disrupted by rural-urban migration, causing a different degree of economic dependence on farmland for rural households engaged in non-agricultural activities (Li et al. 2021). Compared to the secondary-occupation rural households, due to differences in work focus, the part-time rural households place a higher emphasis on farmland. Although farmland certification enhances its "asset effect" and "wealth effect", engaging in agricultural production is a more demanding profession, resulting in a smaller impact on their consumption (Geng et al. 2021).

On the other hand, China's socio-economic landscape has changed dramatically since the reform and opening-up, which has led to increasingly obvious generational differences between the old and new generations of farmers. There are distinct differences in the willingness to return home and consumption preferences between the first-generation farmers and the second-generation farmers (Liu et al. 2023). Compared to the first-generation farmers, younger second-generation farmers are more inclined to live in cities, and their long-term separation from their homeland has led to a lower level of dependence on farmland. Influenced by modern consumption concepts and facing significant real-world pressures, the second-generation farmers are increasingly inclined to use the "asset effect" and "wealth effect" derived from farmland for consumption rather than savings.

Notably, despite China's economic miracles since the reform and opening up, including the attainment of comprehensive well-being for all Chinese people, including rural residents (Dang et al. 2023), it is undeniable that uneven and inadequate development remains the primary contradiction in today's Chinese society. The imbalance in development is primarily reflected in the disparity between regional economic development levels and income levels among residents (Cao et al. 2023; Guo et al. 2023; Ding and Kang 2024). Therefore, the level of regional economic development and individual income are significant factors influencing rural household consumption (Li et al. 2021). In the context of varying market economic development and income levels across regions and individuals, farmland certification may also exert distinct effects on rural household consumption.

Based on the above theoretical analysis, this paper constructs an analysis framework as shown in Fig. 1.

Research design

Data. The data used in the research comes from the China Rural Household Panel Survey (CRHPS) database of Zhejiang University, which includes unbalanced panel data from two periods in 2017 and 2019. The survey adopts stratified, three-stage and proportional sampling methods. It has 29 provincial samples except Hong Kong, Macao, Taiwan, Xinjiang and Xizang, and has data representativeness at rural, urban, provincial and national levels. In order to further research the impact of farmland certification on rural household consumption, based on a series of data cleaning, this paper retained key variables such as farmland certification, farmland transfer, income and consumption expenditure, individual characteristics of household heads, and household characteristics, and finally obtained sample data of 14,607 rural households distributed in 29 provinces across the country.

Variables and descriptive statistics

Dependent variables. The dependent variable of this paper is rural households' consumption. According to Yin (2007), consumption is mainly composed of consumption level and consumption structure. For the former, the consumption level refers to the researches of Tian et al. (2022) and Wang and Li (2024), and is depicted by the per capita total consumption expenditure of rural households. For the latter, according to Engels' scientific classification of consumer goods, consumer goods can be divided into expenditure on basic survival goods, expenditure on development goods and expenditure on enjoyment goods based on the level of meeting different consumption needs to specifically measure the consumption structure. Therefore, this paper divides per capita total consumption expenditure of rural households into three types: Per capita subsistence consumption, per capita development consumption and per capita enjoyment consumption to measure consumption structure of rural households, which is also a commonly used classification method in existing literature (Chen and Li 2013; Li and Li 2016; Cao et al. 2023).

Among them, subsistence consumption is the necessary consumption for rural households to maintain their survival, mainly including food, clothing and housing expenditures (Cao et al. 2023; Tan and Yao 2022; Wei et al. 2023); development consumption is the necessary consumption for expanding reproduction, which is the consumption demand generated to solve better and higher development, mainly including education, transportation and communication, and healthcare consumption expenditures (Wang et al. 2021; Qi and Ma 2021; Cao et al. 2023); enjoyment consumption is the consumption that arises to meet the needs for comfort, enjoyment and happiness, mainly including leisure, entertainment, tourism and cultural consumption expenditures (Wang et al. 2021; Li et al. 2023).

To ensure the stability of the data and overcome the nonlinear problem between variables, in the empirical test, the natural logarithm of the annual expenditure of rural households' per

Table 1 Variable definitions and description statistics (N = 14,607).

Variables	Definition and assignment	Mean	SD	Max	Min
Total consumption expenditure	ln (1 + per capita total consumption expenditure of rural households)	10.021	1.127	14.071	6.908
Subsistence consumption expenditure	ln (1 + per capita subsistence consumption expenditure of rural households)	8.508	1.401	13.370	4.329
Development consumption expenditure	ln (1 + per capita development consumption expenditure of rural households)	7.573	1.121	10.903	4.592
Enjoyment consumption expenditure	ln (1 + per capita enjoyment consumption expenditure of rural households)	8.481	1.195	10.406	4.097
Farmland certification	Has your family obtained the farmland management right certificate since 2013? (yes = 1, 0 = no)	0.497	0.509	1	0
Gender of head of household	1 = male, 0 = female	0.792	0.437	1	0
Age of head of household	Year	53.681	15.003	82	22
Education level of head of household	1 = no schooling, 2 = primary school, 3 = junior high school, 4 = high school, 5 = technical secondary school, 6 = junior college, 7 = undergraduate, 8 = postgraduate, 9 = doctor	2.995	1.328	9	1
Health status of head of household	Very good = 1, good = 2, general = 3, bad = 4, very bad = 5	2.783	1.301	5	1
Marital status of head of household	0 = unmarried, 1 = other types of marital status	0.902	0.315	1	0
Family size	People	3.809	1.823	20	1
Per capita household income	ln (1 + per capita household income)	12.021	1.414	14.408	7.498
Per capita household assets	ln (1 + per capita household assets)	8.369	2.387	11.709	0

capita total consumption, per capita subsistence consumption, per capita development consumption and per capita enjoyment consumption plus 1 is taken to represent the explained variable.

Core independent variable. Farmland certification is the core independent variable of this paper. Considering that the issuance of farmland property right certificate is a crucial link in the work of farmland certification, and the confirmation and issuance of farmland property right certificate will directly affect rural households' satisfaction with the work of farmland certification, this paper uses the research ideas of Geng and Luo (2022) for reference. This paper mainly identifies the question "whether your family has obtained the farmland management certificate?" in the questionnaire, and determines the starting time of farmland certification as 2013. Compared with some literatures that generally measure the new round of farmland certification (Qian et al. 2021), this paper sets the starting time of farmland certification as 2013, mainly because the No. 1 Document of the Central Government clearly indicates that it will take 5 years to complete the farmland certification. This state led reform of farmland certification not only requires compulsory promotion, but also needs to be completed on schedule. It does not transfer the will of rural households, which largely reduces the selective error in the implementation of the reform of farmland certification.

Other control variables. This paper takes the variables at the level of the head of household characteristics (Kristin and Kleinjans 2013; Geng et al. 2021; Zhu et al. 2022) and family characteristics (Song et al. 2024; Zheng 2024) that affect rural household consumption as control variables. Among them, the head of household characteristic variables include head of household gender, head of household age, head of household education level, head of household health status and head of household marital status (Li and Qin 2022; Zheng 2023); family characteristic variables include family population, per capita household income and per capita household assets (logarithm). See Table 1 for specific related variable settings and statistical description.

Econometric model. As this paper mainly examines the impact of farmland certification on rural household consumption, the

following panel two-way fixed effect regression model is constructed according to the research design of Chaisemartin and Haultfoeuille (2023):

$$CS_{it} = \alpha_0 + \alpha_1 FC_{it} + \alpha_2 D_{it} + \varepsilon_{it1} \quad (1)$$

In formula (1), i stands for rural households and t stands for time. CS refers to the per capita total consumption expenditure, per capita subsistence consumption expenditure, per capita development consumption expenditure and per capita enjoyment consumption expenditure; FC means a new round of farmland certification; D represents a matrix composed of a series of control variables of household head characteristics and family characteristics; α_0 is a constant term, α_1 and α_2 is the coefficient to be estimated, ε_{it1} is the error term and is assumed to satisfy the standard normal distribution.

Further, in view of the inevitable defects of the traditional three-step mediation effect model, the direct test of the impact of farmland certification on the two mechanism variables of farmland transfer-out and long-term investment in farmland may lead to more authentic results (Jiang 2022). Therefore, the following mechanism test model is constructed:

$$M_{it} = \beta_0 + \beta_1 FC_{it} + \beta_2 D_{it} + \varepsilon_{it2} \quad (2)$$

In formula (2), i stands for rural households and t stands for time. M refers to farmland transfer-out and long-term investment in farmland; β_0 is a constant term, β_1 and β_2 is the coefficient to be estimated; ε_{it2} is the error term and is assumed to satisfy the standard normal distribution; the definitions of other variables are consistent with Eq. (1).

Empirical results

Benchmark regression results. Table 2 reports the estimated results of farmland certification on rural household consumption. The preliminary results showed that the impact coefficient of farmland certification on rural household per capita total consumption expenditure was 0.067, which was significant at the 1% level, indicating that farmland certification significantly improved rural household consumption level. In addition, the impact coefficients of farmland certification on rural household per capita subsistence consumption expenditure and rural household

Table 2 The impact of farmland certification on rural household consumption: benchmark regression results.

Variables	Total consumption expenditure	Subsistence consumption expenditure	Development consumption expenditure	Enjoyment consumption expenditure
Farmland certification	0.067*** (0.009)	0.048*** (0.008)	0.079*** (0.010)	0.016 (0.036)
Gender of head of household	−0.039 (0.051)	−0.070 (0.064)	−0.056 (0.062)	−0.080*** (0.015)
Age of head of household	−0.030*** (0.005)	−0.040*** (0.006)	−0.029*** (0.007)	−0.017*** (0.006)
Square of the age of the head of household	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)	0.000 (0.000)
Education level of head of household	0.021 (0.019)	0.027 (0.103)	0.079 (0.135)	0.088*** (0.021)
Health status of head of household	0.022 (0.021)	−0.018 (0.024)	0.179*** (0.015)	−0.113*** (0.011)
Marital status of head of household	0.000 (0.018)	−0.023 (0.019)	0.041*** (0.015)	0.027 (0.032)
Family size	−0.089*** (0.008)	−0.087*** (0.009)	−0.043*** (0.008)	−0.099*** (0.007)
Per capita household income	0.312*** (0.010)	0.261*** (0.011)	0.253*** (0.011)	0.437*** (0.013)
Per capita household assets	0.057*** (0.007)	0.059*** (0.006)	0.048*** (0.006)	0.051*** (0.008)
Time fixed effect	Yes	Yes	Yes	Yes
Rural household fixed effect	Yes	Yes	Yes	Yes
Constant term	7.283*** (0.186)	6.959*** (0.192)	6.008*** (0.210)	4.172*** (0.124)
R ²	0.301	0.165	0.171	0.317
N	14607	14607	14607	14607

*** is significant at 1% level. The values in brackets are robust standard errors.

per capita development consumption expenditure were 0.048 and 0.079 respectively, which passed the significance level test of 1%, and the former coefficient was less than the latter, while farmland certification did not significantly promote rural household per capita enjoyment consumption expenditure. In general, farmland certification is beneficial to optimize rural household consumption structure. Therefore, the new round of farmland certification characterized by strengthening the stability of farmland property rights has positive policy performance, which can significantly improve the consumption level and optimize the consumption structure of rural households.

The reason is that the new round of farmland certification can not only promote the allocation of farmland resources and enable rural households to transfer-out of cultivated land with peace of mind by issuing land ownership certificates with multiple economic uses and mandatory legal effects to rural households, which can not only obtain farmland rent income, but also earn more non-agricultural income through non-agricultural employment. It can also increase investment incentives for farmland, allow rural households to increase long-term investment in marginal cultivated land, and further improve irrigation facilities for cultivated land, so as to improve agricultural production efficiency and increase agricultural production income, thus greatly enhancing the “asset effect” and “wealth effect” of rural households, and ultimately play a positive incentive role in improving rural household consumption level and optimizing rural household consumption structure.

Robustness test

Retest by replacing the core independent variable. In order to eliminate the estimation bias caused by measurement errors, this paper uses the research ideas of Qiu and Luo (2020) for reference, and uses “whether your family has signed a farmland contract

since 2013” as an alternative variable of “whether your family has obtained a farmland management right certificate since 2013” to test the robustness. This is mainly because *the Property Law* promulgated and implemented in 2007 further recognizes and endows rural households with usufructuary rights to land. Under the support of this law, farmland contract can not only better reflect the characteristics of “empowerment” of farmland property rights, but also reflect the stability of farmland property rights at the factual level. Therefore, farmland contract is an important indicator reflecting the stability of farmland property rights. The results in Table 3 show that farmland certification has significantly promoted the per capita total consumption expenditure, per capita subsistence consumption expenditure and per capita development consumption expenditure of rural households, and the coefficient of per capita development consumption expenditure is greater than that of per capita subsistence consumption expenditure of rural households, but farmland certification has not significantly improved per capita enjoyment consumption expenditure of rural households, which can show that the benchmark regression results in this paper are robust.

Retest with PSM method. In the process of promoting the certification of farmland management rights in rural areas of China, it is usually carried out in a gradual way, which is easy first, then difficult, and then gradually promoted by local pilot projects. This shows that the order in which rural households in different rural areas of China obtain farmland management rights certificates is not random, which may lead to deviation in the selection of samples (Qian et al. 2021). In order to eliminate the endogenous problem caused by the possible selective bias of samples, this paper uses the propensity score matching method (PSM) to test the robustness. Therefore, the rural households with confirmed rights were set as the experimental group, and the rural

Table 3 Robustness test I: retest by replacing core explanatory variable.

Variables	Total consumption expenditure	Subsistence consumption expenditure	Development consumption expenditure	Enjoyment consumption expenditure
Farmland certification	0.068*** (0.014)	0.050*** (0.011)	0.083*** (0.009)	0.012 (0.041)
Control variables	Yes	Yes	Yes	Yes
Constant term	6.327*** (0.191)	5.979*** (0.117)	5.781*** (0.136)	4.006*** (0.125)
R ²	0.194	0.168	0.154	0.206
N	14,305	14,305	14,305	14,305

*** is significant at 1% level. The values in brackets are robust standard errors.

Table 4 Robustness test II: retest using PSM method.

Variables	Matching method	ATT	T-test value
Total consumption expenditure	Nearest neighbor matching	0.049***	4.091
	Radius matching	0.042***	4.362
	Kernel matching	0.039***	3.881
Subsistence consumption expenditure	Nearest neighbor matching	0.031***	3.007
	Radius matching	0.029***	3.327
	Kernel matching	0.032***	3.651
Development consumption expenditure	Nearest neighbor matching	0.089***	4.587
	Radius matching	0.081***	4.619
	Kernel matching	0.083***	4.316
Enjoyment consumption expenditure	Nearest neighbor matching	0.051	1.035
	Radius matching	0.043	1.112
	Kernel matching	0.046	1.273

*** is significant at 1% level.

households without confirmed rights were set as the control group.

The nearest neighbor matching ($k=4$), radius matching (caliper = 0.05) and kernel matching (secondary kernel, bandwidth = 0.06) were used to estimate the average treatment effect on the treated (ATT) of the new round of farmland certification. The results in Table 4 show that farmland certification has significantly promoted rural household per capita total consumption expenditure, per capita subsistence consumption expenditure and per capita development consumption expenditure, and the average treatment effect on the treated (ATT) of rural household per capita development consumption expenditure is greater than rural household per capita subsistence consumption expenditure, but the farmland certification has not significantly improved rural households' per capita enjoyment consumption expenditure, which shows that the benchmark regression results are robust.

Retest considering missing variables. In order to exclude the missing variables, the estimation results may be biased. Based on the research and design of Guo and Ma (2023), this paper first constructs two different sets of finite variable control. Secondly, the coefficient a of the core independent variable after controlling the first finite variable set is calculated. Thirdly, calculate the coefficient b of the core independent variable of the second finite variable set after adding as many control variables as possible and within a reasonable range on the basis of the first finite variable set. Then, the ratio index is constructed by using the values of a

and b ; where ratio = $b/[b - a]$. Finally, observe the size of ratio value. If the value is larger, the selected covariates have better explanatory power, so the probability of missing variables that are not observed will be smaller.

The specific test process is as follows: First, this paper constructs two sets, set 1 contains only the individual characteristics of the head of household, and set 2 contains the individual characteristics of the head of household and the family characteristics. Second, the ratio values calculated from set 1 and set 2 are 65.376, 146.134, 279.539 and 126.320 respectively, and all the ratio values are far greater than 1 (see Table 5), so the benchmark regression estimate in this paper is less affected by the possible existence of missing variables that are not observed. In other words, if there are unobserved missing variables that may impact the consistency of the benchmark regression estimates in this paper, the number of them is at least 65.376, 146.134, 279.539 and 126.320 times of the number of variables that have been selected respectively.

Therefore, after controlling the variables such as the individual characteristics of the head of household and the family characteristics, it can still be shown that even if there are unobserved missing variables, it is not enough to cause a bias impact on the consistency of the existing benchmark regression estimates in this paper, which shows that the benchmark regression results in this paper are robust and authentic.

Retest by changing samples. Major grain producing areas have the strategic effect of ensuring national food security. China established 13 provinces as major grain producing areas through administrative means in 2004. Compared with non major grain producing areas, the state has directly or indirectly affected rural households' production and life in major grain producing areas by increasing subsidies for improved varieties, direct subsidies and comprehensive subsidies for agricultural materials, raising the minimum purchase price of grain, and strengthening the construction of large commodity grain bases and agricultural insurance support. At the same time, the data of the third national land survey showed that the cultivated land area of 13 major grain producing areas was 1295.2606 million mu, accounting for 67.534% of the total cultivated land area in China. Therefore, the performance of farmland certification in major grain producing areas can almost represent the development of farmland certification at the national level. Therefore, we will use the rural household sample data of 13 provinces in the main grain producing areas in the CRHPS database to further estimate the model of formula (1) to investigate the impact of farmland certification on rural household consumption. Comparing Tables 2 and 6, it is not difficult to find that for rural households in major grain producing areas, the effect of farmland certification is more obvious. Farmland certification still significantly promotes rural household per capita total consumption

Table 5 Robustness test III: retest considering missing variables.

Variables	Set	Estimated coefficient	Ratio value
Total consumption expenditure	Set 1 (individual characteristic variables of household head)	0.061132	Set 1-2: 65.376
	Set 2 (individual characteristic variables of household head + family characteristic variables)	0.060211	
Subsistence consumption expenditure	Set 1 (individual characteristic variables of household head)	0.049781	Set 1-2: 146.134
	Set 2 (individual characteristic variables of household head + family characteristic variables)	0.050124	
Development consumption expenditure	Set 1 (individual characteristic variables of household head)	0.071257	Set 1-2: 279.539
	Set 2 (individual characteristic variables of household head + family characteristic variables)	0.071003	
Enjoyment consumption expenditure	Set 1 (individual characteristic variables of household head)	0.012908	Set 1-2: 126.320
	Set 2 (individual characteristic variables of household head + family characteristic variables)	0.013011	

Table 6 Robustness test IV: retest by changing samples.

Variables	Total consumption expenditure	Subsistence consumption expenditure	Development consumption expenditure	Enjoyment consumption expenditure
Farmland certification	0.071*** (0.013)	0.067*** (0.016)	0.091*** (0.017)	0.029 (0.041)
Control variables	Yes	Yes	Yes	Yes
Constant term	7.237*** (0.147)	7.538*** (0.133)	6.972*** (0.129)	5.873*** (0.256)
R ²	0.201	0.117	0.121	0.271
N	7625	7625	7625	7625

*** is significant at 1% level. The values in brackets are robust standard errors.

Table 7 Robustness test V: retest with instrumental variable.

Variables	Total consumption expenditure	Subsistence consumption expenditure	Development consumption expenditure	Enjoyment consumption expenditure
Farmland certification	0.051*** (0.008)	0.039*** (0.011)	0.057*** (0.009)	0.031 (0.042)
Control variables	Yes	Yes	Yes	Yes
Constant term	8.937*** (0.411)	8.062*** (0.352)	8.671*** (0.421)	7.995*** (0.357)
First stage F value	99.882	93.376	98.712	96.054
DWH test	13.098***	14.957***	14.636***	14.835***
N	14,607	14,607	14,607	14,607

*** is significant at 1% level. The values in brackets are robust standard errors.

expenditure, per capita subsistence consumption expenditure and per capita development consumption expenditure, and the coefficient of per capita development consumption expenditure for rural households is greater than per capita subsistence consumption expenditure, but farmland certification does not significantly improve rural household per capita enjoyment consumption expenditure.

Retest with instrumental variable. When examining the impact of farmland certification on rural household consumption, there may be an endogenous problem caused by reverse causality. The direct use of the estimation method of the panel two-way fixed effect model is more likely to cause errors in the regression estimation of the model. In this regard, this paper attempts to build an instrumental variable model to eliminate the endogenous problem caused by reverse causality. Therefore, referring to the research ideas of Card and Krueger (1996), this paper takes the proportion of rural households' farmland certification in other villages in the same town as a instrumental variable. According to the research

results in Table 7, the *F* values in the first stage are far greater than 10, indicating that there is no problem of weak instrumental variable in the model; DWH value rejects the original assumption that farmland certification is an exogenous variable at 1% level, indicating that the model has endogenous problems. However, after correcting the endogenous problems caused by reverse causality, the regression results still show that farmland certification can improve the consumption level of rural households and optimize the consumption structure of rural households.

Mechanism analysis. The previous estimation results have shown that the farmland certification has significantly improved the consumption level and optimized the consumption structure of rural households. So, as analyzed in theory, does this mean that the new round of farmland certification characterized by strengthening the stability of farmland property rights is really to improve rural household consumption level and optimize rural household consumption structure by promoting the transfer-out

Table 8 The impact of farmland certification on rural household consumption: mechanism analysis.

Mechanism of action	Dependent variables	Estimated coefficient	Control variables	Constant term	R ²	N
Farmland transfer-out	Whether your farmland is transferred to others or institutions (1 = yes, 0 = no)	0.021*** (0.004)	Yes	−0.317*** (0.032)	0.125	11031
Long term investment in farmland	Whether the farmland has irrigation facilities (1 = yes, 0 = no)	0.035*** (0.008)	Yes	−0.291*** (0.047)	0.217	11836

*** is significant at 1% level. The values in brackets are robust standard errors.

Table 9 The impact of farmland certification on rural household consumption: from the perspective of differences in part-time employment.

Variables		Farmland certification	Control variables	Constant term	R ²	N
The part-time rural households	Total consumption expenditure	0.057*** (0.011)	Yes	7.113*** (0.231)	0.210	6173
	Subsistence consumption expenditure	0.049*** (0.012)	Yes	6.978*** (0.219)	0.217	6173
	Development consumption expenditure	0.074*** (0.012)	Yes	5.672*** (0.226)	0.223	6173
	Enjoyment consumption expenditure	−0.039 (0.042)	Yes	4.524*** (0.223)	0.323	6173
The secondary-occupation rural households	Total consumption expenditure	0.069*** (0.018)	Yes	7.065*** (0.218)	0.118	8434
	Subsistence consumption expenditure	0.058*** (0.016)	Yes	7.127*** (0.251)	0.131	8434
	Development consumption expenditure	0.121*** (0.023)	Yes	7.001*** (0.237)	0.210	8434
	Enjoyment consumption expenditure	0.088*** (0.021)	Yes	6.051*** (0.309)	0.223	8434

*** is significant at 1% level. The values in brackets are robust standard errors.

of farmland and enhancing long-term investment in farmland? Therefore, according to the research ideas of Min et al. (2024) and Qian et al. (2022), let the farmland certification carry out (2) model regression estimation on farmland transfer-out and farmland long-term investment respectively, and test the relevant internal mechanism. The results in Table 8 show that farmland certification has significantly promoted the occurrence of farmland transfer-out and increased the possibility of long-term investment in farmland, and passed the statistical test at the 1% level. This means that farmland certification can not only allow rural households to transfer-out of farmland with confidence, which can not only obtain farmland rent income, but also engage in non-agricultural employment to earn more non-agricultural income; moreover, it can also increase the long-term investment expenditure on farmland, improve farmland irrigation facilities, improve agricultural production efficiency and increase agricultural production income, and enhance the “asset effect” and “wealth effect” of rural households, so as to improve the consumption level and optimize the consumption structure of rural households.

Endogeneity discussion. Endogenous problems are mainly caused by measurement errors, selective errors, missing variables and reverse causality. For the problem of measurement error, this paper redefines the core independent variable to solve it. Aiming at the problem of selective bias, this paper uses the propensity score matching method (PSM) to alleviate it. PSM can effectively avoid the estimation bias caused by the self selection of samples through the matching resampling method, so as to improve the accuracy of the estimation results. For the problem of missing variables, this study refers to the existing literature to add as many control variables as possible to eliminate the influence of missing observable factors on the regression estimation results in this

paper. Further, the ratio index values constructed are far greater than 1, which shows that there is no obvious problem of missing variables in this paper. As for the problem of reverse causality, since the new round of farmland certification is dominated and forced by the state, it is not up to rural households to determine whether the right is confirmed or not, and whether rural households consume or not does not determine the reform of farmland certification (Min et al. 2024); further, the instrumental variable method is used to solve the problem, so the possibility of reverse causality at the rural households’ level is small. At the same time, this paper uses the rural households’ data of 13 provinces in the main grain producing areas to conduct sub sample retest, excluding the influence of different samples on the results with different sensitivities. To sum up, strictly speaking, there is no particularly serious endogenous problem in this paper.

Heterogeneity analysis

From the perspective of differences in part-time employment.

Using Qian et al.’ (2021) division of different part-time rural households for reference, according to whether the household non-agricultural employment rate is more than 50%, the rural households are roughly divided into the part-time rural households who are mainly engaged in agriculture and the secondary-occupation rural households who are mainly engaged in non-agriculture, and then the regression estimation of the model (1) is carried out. Table 9 reports the impact of farmland certification on rural household consumption from the perspective of differences in part-time employment. The sub sample estimation results show that whether it is the part-time rural households or the secondary-occupation rural households, farmland certification has significantly improved the consumption level and optimized the consumption structure of rural households. However, the positive consumption effect of farmland certification on the secondary-

Table 10 The impact of farmland certification on rural household consumption: based on the perspective of intergenerational differences.

Variables		Farmland certification		Control variables	Constant term		R ²	N
The first-generation farmers	Total consumption expenditure	0.065***	(0.023)	Yes	7.801***	(0.421)	0.214	12,510
	Subsistence consumption expenditure	0.051**	(0.022)	Yes	7.932***	(0.931)	0.229	12,510
	Development consumption expenditure	0.081***	(0.011)	Yes	8.007***	(0.886)	0.231	12,510
	Enjoyment consumption expenditure	0.031	(0.033)	Yes	6.231***	(0.754)	0.301	12,510
The second-generation farmers	Total consumption expenditure	0.088***	(0.019)	Yes	6.734***	(0.113)	0.225	2097
	Subsistence consumption expenditure	0.076***	(0.032)	Yes	6.821***	(0.237)	0.301	2097
	Development consumption expenditure	0.201***	(0.011)	Yes	5.904***	(0.873)	0.197	2097
	Enjoyment consumption expenditure	0.055	(0.112)	Yes	5.671***	(0.578)	0.204	2097

, * are significant at 5% and 1% levels respectively. The values in brackets are robust standard errors.

occupation rural households is significantly greater than that of the part-time rural households. The possible reasons are as follows: The part-time rural households mainly live on land and take agriculture as their industry. Although the property right protection brought by farmland certification enhances its “asset effect” and “wealth effect”, after all, engaging in agriculture is a difficult job, and the income brought by production and operation is relatively small, so the consumption effect of farmland certification on the part-time rural households is relatively weak. In contrast, the agricultural income of the second-occupation rural households is relatively low, and the focus of the work is on non-agricultural management. Farmland certification has a stronger “asset effect” and “wealth effect” on them, so the reform of farmland certification has brought them a more obvious consumption effect. For example, farmland certification at the significance level of 1% has positively promoted the per capita consumption expenditure of the second-occupation rural households.

From the perspective of intergenerational differences.

According to the classification criteria of Liu et al. (2023) and Cao et al. (2023), this paper considers farmers born before 1980 as the first-generation farmers, and those born after 1980 as the second-generation farmers. Then, the regression estimation of the model in Eq. (1) is conducted. Table 10 reports the impact of farmland certification on rural household consumption from the perspective of intergenerational differences. The sub sample estimation results show that both the first-generation farmers and the second-generation farmers have significantly positive effects on their consumption levels and consumption structures. However, the positive consumption impact effect of farmland certification on the second-generation farmers is significantly greater than that of the first-generation farmers. The possible explanation mainly lies in the fact that, compared to the first-generation farmers, the second-generation farmers are in middle age and need to bear the dual responsibilities of raising children and supporting the elderly. Moreover, they are also the main maintainers of family social relationships. Farmland certification strengthens their “asset effect” and “wealth effect”, and further produces a more significant positive consumption impact effect on them. On the contrary, although there is a relatively serious “attachment to the land complex” among the first-generation farmers, they are more concerned about the protection of their legitimate rights and interests from farmland certification, and focus on extracting more value from farmland. However, as the first-generation farmers gradually age, their consumption enthusiasm will

decrease, resulting in the continuous weakening of the positive consumption impact effect of farmland certification on them.

From the perspective of regional development. Since the reform and opening-up strategy has been pushed from the eastern coast to the inland of the central and western regions, the level of economic development in China has shown a gradually decreasing difference between the eastern, central and western regions. Therefore, this paper will divide China into three types of provinces and regions in the east, the middle and the west according to the level of economic development, and then make regression estimation on the model (1) to verify whether there is heterogeneity in the impact of farmland certification on rural household consumption in provinces and regions with different levels of economic development. Table 11 reports the impact of farmland certification on rural household consumption from the perspective of regional development. The sub sample estimation results show that the farmland certification in the eastern, central and western regions has significantly improved the consumption level of rural households and optimized the consumption structure of rural households. Furthermore, the effect of farmland certification on rural household positive consumption is obviously different in the east > the middle > the west. Specifically, the per capita total consumption expenditure of rural households in the eastern region increased by 10.7%, while that in the central and western regions were 8.6% and 3.8% respectively; the farmland certification in the eastern region increased the per capita subsistence consumption expenditure of rural households by 10.2%, while that in the central region was 6.7%. The farmland certification in the western region did not significantly promote the per capita subsistence consumption expenditure of rural households; the per capita development oriented consumption expenditure of rural households in the eastern region increased by 10.5%, while that in the central and western regions were 8.9% and 8.2% respectively; the farmland certification in the eastern region has increased the per capita enjoyment consumption expenditure of rural households by 9.8%, while the farmland certification in the central and western regions has not significantly promoted the per capita enjoyment consumption expenditure of rural households. The possible reasons for the above differences are as follows: The economic development level of the eastern region has always been ahead of the middle and western regions, which directly leads to the consumption willingness and consumption habits of rural households in the eastern region ahead of the middle and western regions, which will increasingly strengthen the “asset effect” and “wealth effect”

Table 11 The impact of farmland certification on rural household consumption: from the perspective of regional development.

Variables		Farmland certification	Control variables	Constant term	R ²	N
Eastern provinces	Total consumption expenditure	0.107*** (0.012)	Yes	6.932*** (0.433)	0.210	7275
	Subsistence consumption expenditure	0.102** (0.023)	Yes	6.575*** (0.427)	0.232	7275
	Development consumption expenditure	0.105*** (0.024)	Yes	7.025*** (0.438)	0.192	7275
	Enjoyment consumption expenditure	0.098*** (0.019)	Yes	4.973*** (0.421)	0.264	7275
Central provinces	Total consumption expenditure	0.086*** (0.022)	Yes	8.059*** (0.291)	0.228	3799
	Subsistence consumption expenditure	0.067** (0.019)	Yes	8.096*** (0.303)	0.231	3799
	Development consumption expenditure	0.089*** (0.021)	Yes	7.127*** (0.372)	0.197	3799
	Enjoyment consumption expenditure	0.029 (0.031)	Yes	5.349*** (0.358)	0.306	3799
Western provinces	Total consumption expenditure	0.038** (0.016)	Yes	8.275*** (0.306)	0.257	3533
	Subsistence consumption expenditure	0.024 (0.027)	Yes	8.538*** (0.381)	0.263	3533
	Development consumption expenditure	0.082*** (0.016)	Yes	6.783*** (0.299)	0.253	3533
	Enjoyment consumption expenditure	0.036 (0.031)	Yes	5.892*** (0.331)	0.204	3533

, * are significant at 5% and 1% levels respectively. The values in brackets are robust standard errors.

Table 12 The impact of farmland certification on rural household consumption: from the perspective of income level.

Variables		Farmland certification	Control variables	Constant term	R ²	N
High income	Total consumption expenditure	0.073*** (0.017)	Yes	7.418*** (0.221)	0.328	4869
	Subsistence consumption expenditure	0.064*** (0.013)	Yes	7.309*** (0.298)	0.302	4869
	Development consumption expenditure	0.139*** (0.025)	Yes	6.575*** (0.276)	0.209	4869
	Enjoyment consumption expenditure	0.048 (0.039)	Yes	5.937*** (0.337)	0.281	4869
Medim income	Total consumption expenditure	0.069*** (0.018)	Yes	8.756*** (0.201)	0.261	4869
	Subsistence consumption expenditure	0.061*** (0.016)	Yes	8.655*** (0.252)	0.236	4869
	Development consumption expenditure	0.086*** (0.021)	Yes	5.349*** (0.318)	0.198	4869
	Enjoyment consumption expenditure	−0.023 (0.034)	Yes	5.092*** (0.252)	0.308	4869
Low income	Total consumption expenditure	0.019*** (0.005)	Yes	6.077*** (0.278)	0.231	4869
	Subsistence consumption expenditure	0.005*** (0.001)	Yes	7.026*** (0.334)	0.227	4869
	Development consumption expenditure	0.074*** (0.021)	Yes	8.352*** (0.382)	0.228	4869
	Enjoyment consumption expenditure	0.002 (0.044)	Yes	5.285*** (0.198)	0.239	4869

*** is significant at 1% level. The values in brackets are robust standard errors.

brought about by farmland certification in the eastern region, and make rural households in the eastern region dare to consume in all kinds, so the consumption effect of farmland certification in the eastern region is the most obvious.

From the perspective of income level. Referring to the division design of Cao et al. (2023), this paper uses the trisection method to divide the rural households' sample into three groups according to their income. The high-income, middle-income and low-income groups each account for about 33.33% of the total number of rural households in the sample, and then makes regression estimation for the model (1). Table 12 reports the impact of farmland certification on rural household consumption from the perspective of income level. The sub sample estimation results show that the farmland certification of high-income, middle-income and low-income groups has significantly improved the consumption level and optimized the consumption structure of rural households. Furthermore, the effect of farmland certification on rural household positive consumption is obviously different in high income > middle income > low income. Specifically, the per capita total consumption expenditure of rural households in high-income groups increased by 7.3%, while that in middle-income and low-income groups were 6.9% and 1.9% respectively; the per capita subsistence consumption expenditure of rural households in high-income groups increased by 6.4%, while that in middle-income and low-income groups were 6.1% and 0.5% respectively; in the high-income group, the per capita development consumption expenditure of rural households increased by 13.9%, while in the middle-income and low-income groups, it was 8.6% and 7.4% respectively.

The possible explanation for the above differences is that under the premise of the absolute income hypothesis, consumption can be regarded as a function of the absolute income level. The current consumption depends on the current income, and the current disposable income is the core decisive factor of consumption (Keynes 1936). Therefore, farmland certification has increasingly enhanced the "asset effect" and "wealth effect" of high-income groups. At the same time, due to the existence of Matthew effect, the consumption effect of farmland certification in high-income rural households is particularly prominent.

Conclusions and policy recommendations

Conclusions. Improving the consumption level and optimizing the consumption structure of rural households are the major strategic requirements for building a new development pattern. As the most important institutional arrangement for empowerment and strengthening capabilities, farmland certification is an crucial engine for tapping rural consumption potential. Based on the unbalanced panel data of two periods of China Rural Household Panel Survey (CRHPS) from 2017 to 2019, this paper empirically investigates the impact of the new round of farmland certification on rural household consumption by using the panel two-way fixed effect model. The main conclusions are as follows:

First, farmland certification has a significant positive impact on rural household consumption level, which can optimize rural household consumption structure in general. Specifically, farmland certification has increased the per capita total consumption expenditure of rural households by 6.7%, the

per capita subsistence consumption expenditure of rural households by 4.8% and the per capita development consumption expenditure of rural households by 7.9% respectively, but it has not yet had a significant impact on the per capita enjoyment consumption expenditure of rural households. At the same time, the above research results are still robust after the possible endogenous problems are eliminated by replacing the core independent variable retest, using the PSM method retest, considering the missing variable retest, changing the sample retest and instrumental variable method retest, indicating that the conclusion of the benchmark regression is true and credible to a large extent.

Second, farmland certification not only helps to promote the farmland transfer-out and realize the optimal allocation of farmland resources, but also helps to enhance the long-term investment in farmland, increase the expenditure on farmland irrigation facilities, enhance the “asset effect” and “wealth effect” of rural households, and then have an impact on rural households’ consumption.

Third, the impact of farmland certification on the consumption of the secondary-occupation rural households and the second-generation farmers is greater than that of the part-time rural households and the first-generation farmers respectively. In the eastern region and the high-income group, the impact of farmland certification on the consumption of rural households is higher than that of the central and western regions, as well as the middle and low-income groups respectively.

Policy recommendations. In order to further release the consumption ability of rural households, improve the consumption level of rural households, and optimize the consumption structure of rural households, this paper draws the following policy implications:

First, attach great importance to the protection of farmland property rights. The new round of land contracting should be extended for another 30 years after the expiration of the second round of land contracting, and the contracted land should not be disrupted and redivided, so as to ensure that the vast majority of rural households’ original contracted land remains stable.

Second, we should be good at exploring the institutional heritage brought by the new round of farmland certification, and not only pay attention to the role of farmland certification in optimizing the allocation of farmland resources by affecting the transfer-out of farmland, but also realize the efficient use of farmland.

Third, the impact of farmland certification on consumption is characterized by heterogeneity in terms of the differences in part-time employment, intergenerational differences, different regional development and income levels. Therefore, improving rural household consumption level and optimizing rural household consumption structure should be adapted to local conditions and people, and policy formulation should be targeted.

Finally, improving rural household consumption level and optimizing rural household consumption structure still need to achieve high-quality economic development, establish and improve the social security system, and guide the formation of healthy and reasonable consumption habits.

Data availability

The raw data for this study are sourced from the China Rural Household Panel Survey (CRHPS): <http://ssec.zju.edu.cn/dataset/CRHPS/>. We are not authorized to publish these data in public forum, but any questions regarding the data can be directly addressed to the corresponding author of this study.

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Note

- 1 Consumption structure optimization means that when rural households’ subsistence consumption expenditure is satisfied, rural households’ higher-level consumption such as development consumption and even enjoyment consumption expenditure will increase. The specific performance is that the coefficient of development consumption expenditure or enjoyment consumption expenditure is significantly higher than that of subsistence consumption expenditure (Tan and Yao 2022).

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Author contributions

LL and MYH conceived, designed the study, and completed the original manuscript. LL, SYQ and DLZ completed the methodology and revised the article.

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The authors declare no competing interests.

Ethical approval

This article does not contain any studies with human participants performed by any of the authors.

Informed consent

Ethical approval was not required as the study did not involve human participants.

Additional information

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