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EDITED BY
Oriana Gava,
Council for Agricultural Research and Economics, Italy

REVIEWED BY
Fanglei Zhong,
Minzu University of China, China
Jiayi Wang,
Guizhou Minzu University, China

*CORRESPONDENCE
Mei Zhang
✉ zhangm@zuwe.edu.cn

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How does the rural collective economy enhance the farmers' sense of spiritual gain—micro-level evidence from cultural and public service functions

Mei Zhang[1]* and Zenghui Huo[2]

[1]Nanxun Innovation Institute, Zhejiang University of Water Resources and Electric Power, Hangzhou, China, [2]College of Economics and Management, China Jiliang University, Hangzhou, China

In the process of modernization, enhancing the farmers' well-being, in particular, their subjective well-being, has become a key policy goal for the Chinese government. The rural collective economy, characterized by public ownership and cooperative structures, plays a crucial role in fostering farmers' sense of spiritual gain. Drawing on survey data from 44 villages in Zhejiang Province, China, this study systematically examines how the rural collective economic development influences farmers' sense of spiritual gain. The benchmark regression results indicate that the development of the rural collective economy, as well as their cultural function and public service function, significantly improve farmers' sense of spiritual gain. Furthermore, a series of robustness tests using alternative estimation approaches confirm the reliability and stability of these findings. Additionally, considering the heterogeneity of operation modes, the results reveal that compared with the joint operation mode, the independent operation mode of rural collective economies exhibits a significant synergistic effect with cultural functions in enhancing farmers' sense of spiritual gain. Moreover, when accounting for differences in operation scale, the findings indicate that public service functions generate a significant synergistic effect with larger-scale collective economies. In other words, a greater scale of collective economy amplifies the positive influence of public service functions on farmers' sense of spiritual gain.

KEYWORDS

rural collective economy, cultural function, public service function, sense of spiritual gain, heterogeneity analysis

1 Introduction

Achieving modernization is a shared goal pursued by societies worldwide and a key performance sought by governments across nations. The 20th National Congress of the Communist Party of China emphasized the goal of building a modern country in all respects, identifying rural development as a critical challenge in advancing Chinese-style modernization. Accelerating rural modernization thus serves both as a foundation and a vital component of comprehensively advancing Chinese-type modernization. Chinese-type modernization aims to achieve common prosperity for all, emphasizing both material abundance and spiritual richness as core dimensions of modernization. The prosperity of spiritual life, in particular, addresses the transformation of the main social contradiction in the new era (Wang, 2023).

The evaluation of spiritual life prosperity includes both objective and subjective indicators, such as public cultural services (Huang, 2022), cultural participation and enjoyment (Fu and Gao, 2022), and subjective well-being (Wan, 2024). In terms of individual subjective feelings, the sense of spiritual gain has recently emerged as an objective evaluation indicator for achieving the prosperity of people's spiritual life.

The term "sense of gain" was first introduced by Xi Jinping, General Secretary of the Communist Party of China (CPC) Central Committee, in his speech at the 10th Meeting of the (Central Leading Group for Comprehensively Deepening Reforms, 2015). He emphasized that reform should advance under the rule of law, that the legal framework should evolve alongside reform, and that obstacles between the "first mile" and the "last mile" of reform must be removed to prevent inaction and enhance the effectiveness of reform measures. Only then can the people genuinely experience a stronger sense of gain. The reports of the 19th and 20th National Congresses of the Communist Party of China further stressed the need to meet people's growing aspirations for a better life, making their sense of gain more substantial, secure, and sustainable, thereby promoting common prosperity. As a novel analytical concept, the sense of gain serves as an important tool for examining economic and social development as well as national governance (Yang and Ni, 2025). International literature has increasingly applied this concept in diverse contexts, such as citizens' sense of gain in smart city services (Huang et al., 2022; Yu et al., 2023), the elderly's sense of gain in traditional Chinese medical services (Hong et al., 2023), youth's sense of gain (Yang et al., 2024), and college students' sense of gain (Lin et al., 2025). In this study, the term refers to a positive subjective feeling and experience derived from tangible improvements in individuals' spiritual life (Xie, 2024), reflecting their satisfaction with access to spiritual and cultural resources, products, and services (Xiang and Ma, 2022).

The concept closely aligned with the "sense of gain" in Western contexts is subjective well-being, which refers to an individual's overall evaluation of their life based on subjective criteria (Schimmack et al., 2002). Research on subjective well-being spans multiple disciplines—including psychology, economics, and sociology—and investigates how both macro- and micro-level factors shape individual well-being. At the macro level, determinants include economic growth (Bartolini et al., 2017; Kang and Kim, 2022), social inequality (Kelley and Evans, 2017), income inequality (Ding et al., 2021), and social networks (Vezzoli et al., 2023). At the micro level, factors such as age, gender, health (Arechavala et al., 2022; Deaton, 2008), social participation (Zhang et al., 2024) have been widely examined. However, significant differences exist between the sense of gain and subjective well-being (SWB) in both their core meanings and underlying formation mechanisms. From the perspective of core connotations, SWB emphasizes individuals' subjective evaluations of their life conditions and the accompanying emotional experiences, such as pleasure, contentment, and overall life satisfaction. Its meaning is primarily shaped by individuals' psychological cognition, value orientations, and emotional states, rather than being directly influenced by tangible outcomes. In contrast, the sense of gain centers on individuals' or groups' subjective evaluations of their objective gains and losses—for example, income growth, improved public services, or strengthened rights protection—before and after the implementation of reform and development policies (Wang and Ji, 2018). In terms of formation logic, the two concepts follow distinct developmental pathways. SWB is largely a product of subjective construction, reflecting an individual's overall judgment across various life domains, including family, work, and health. The formation of the sense of spiritual gain, however, demonstrates clear condition dependence, as it requires actual, objective improvements as a prerequisite. Without tangible benefits, such as enhanced cultural or public services, the sense of spiritual gain is unlikely to arise. In the present study, for instance, rural residents develop a sense of spiritual gain only when they experience concrete benefits generated by the advancement of the collective economy.

Improving the farmers' sense of gain has become a key performance target for local governments (Zheng, 2023). At the micro level, factors such as personal income growth and a high subjective social class significantly contribute to an enhanced sense of gain (Gao, 2016; Li et al., 2024). Conversely, in-come inequality and relative poverty have been shown to undermine this sense of gain (Wu and Li, 2024; Huo et al., 2022). From a macro perspective, advancements in intelligent infrastructure (Li et al., 2024), effective community public services (Li and Tian, 2024), and high-level digital rural construction (Liu et al., 2024) substantially enhance the farmers' sense of gain. On the contrary, deficiencies in village public services and the lack of spiritual life have been found to reduce or inhibit it (Wang and Zhang, 2024). Regarding spiritual sense of gain, D'Acci (2021) and Li et al. (2023) argue that it refers to citizens' psychological well-being in relation to society and life. Xie (2024) further contends that it embodies both the alignment between the supply and demand of spiritual resources and the internal unity between actual attainment and psychological expectation.

As a form of economic organization in rural areas consistent with China's market-oriented economy, the new rural collective economy plays an important role in enhancing the farmers' well-being. Literature shows that the rapid development of rural collective economies has significantly promoted the common prosperity of farmers and rural areas (Jiang et al., 2023). The new-type rural collective economy facilitates farmers' income growth and common prosperity through labor allocation (Gai et al., 2025), rural industrial transformation (Zhang and Zhang, 2023), profit distribution, provision of non-agricultural employment opportunities (Sun and Zhang, 2022), and promotion of the rural land transfer market (Luan and Zhang, 2024). In addition, the new rural collective economy can form a linkage with the integrated development of industries and enhance farmers' objective well-being (Xu, 2023). At the same time, its expansion and consolidation help narrow the income gap between urban and rural residents, generate multiple social benefits, enhance farmers' satisfaction with village cadres, and promote collective action (Lu et al., 2025). In addition, the development of rural collective economies has been shown to improve farmers' subjective well-being, strengthen their collective consciousness, and enrich their spiritual sense of gain (Luo and Geng, 2024).

In summary, the existing research provides a valuable theoretical and empirical foundation for this study. However, several areas remain underexplored. First, prior studies tend to focus on farmers' overall sense of gain and its determinants, while insufficient attention has been paid to their sense of gain in spiritual life. Second, although research has examined how the rural collective economy can improve economic well-being, there is investigation into how it can empower farmers' spiritual life. In particular, existing research typically measures the development of the rural collective economy by using income or profit, without specifically examining the rural collective economic activities aimed at providing support or assistance.

In view of this, this article aims to explore the influence mechanism of the specific functions of the rural collective economy on farmers' sense of spiritual gain, as well as the heterogeneity of these effects under different operation modes of collective economy. The potential contributions of this article are threefold. First, it extends the concept of farmers' sense of gain to the spiritual life dimension, introducing the notion of the concept of spiritual sense of gain along with its corresponding measurement indicators. Second, by analyzing specific expenditure items related to the rural collective economy, this study identifies cultural functions and public service functions, thereby clarifying how these functions contribute to the farmers' spiritual well-being. In addition, the study examines the moderating effect of different operation models on well-being enhancing function of the collective economy. In summary, this study provides a deeper understanding of the value contribution of China's rural collective economy in improving farmers' spiritual life and offers practical policy implications for optimizing strategies for the development of the rural collective economy institutions.

2 Research design and methodology

2.1 Development of research hypotheses

In December 2016, the Central Committee of the Communist Party of China and the State Council issued the "Opinions on Steadily Promoting the Reform of the Rural Collective Property Rights System," emphasizing the need to explore new forms and operating mechanisms of the collective economic development. This initiative aims to promote agricultural development, farmers' prosperity, and rural prosperity. The No. 1 Central Document of 2024 further highlights the importance of supporting the new rural collective economy in activities such as the utilization of abandoned land, the construction and management of high-standard farmland, and the provision of intermediary services, including production and labor support. Conceptually, the new rural collective economy represents an economic model of shared development structured according to the principles of modern property rights system. It is based on collective land ownership, organized through a shareholding cooperation system, and primarily involves collective members, who are defined by specific geographical and membership boundaries (Xu, 2023).

From the micro-practice perspective, the rural collective economy performs political, economic and social functions (Xue et al., 2010). In the current context, discussions of its functional positioning should prioritize the goal of achieving common prosperity for farmers (Hui, 2023). Consistent with the goal of enhancing farmers' sense of spiritual gain, this study focuses on the cultural and public service functions of the new rural collective economy.

Literature shows that the rural collective economy plays an important role in preserving local culture, embedding itself within local society and transforming local civilization. By providing cultural facilities and organizing cultural activities, it continuously meets the needs of members for spiritual and cultural products (Liu et al., 2018). On the one hand, the rural collective economy is responsible for constructing and maintaining cultural and living facilities in the village, such as cultural auditoriums, libraries, outdoor sports venues, performance costumes, audio equipment and musical instrument props, among others (Wang and Zhang, 2023). On the other hand, it supports public cultural activities by covering expenses for events such as table tennis matches, basketball games, rural music festivals, and village song competitions. These initiatives significantly enrich the quality of villagers' leisure life and enhance their sense of spiritual gain.

By providing social security and services such as education, medical care, and elderly care, the collective economy addresses the farmers' public service needs and improve their quality of life (Gao and Jiang, 2024). A survey of 107 villages in China shows that approximately 8% of villages have incurred public welfare expenditures (Wu and Zheng, 2023). While the proportion remains relatively low, fair welfare supply mechanisms, such as free three meals and medical endowment insurance for villagers, play a crucial role in cultivating a sense of unity and community in the village (Zhao, 2023).

Based on this discussion, this study proposes Hypothesis 1: The cultural and public service functions of the rural collective economy significantly enhance farmers' sense of spiritual gain.

2.2 Data

The research data were collected through the household survey data conducted in rural areas of Zhejiang from July to September 2023. To ensure data quality, two experts are invited to conduct a preliminary evaluation of the questionnaire, and investigators received comprehensive training prior to the survey. Using a stratified random sampling method, the investigators conducted onsite investigations and interviewed with village cadres and the collective economic managers. The questionnaire primarily covered basic household information, farmers' evaluations of family livelihoods, and farmers' evaluations of the role played by the rural collective economy. A total of 1,118 household questionnaires and 55 rural collective economy questionnaires were obtained. After data cleaning and removing missing data, 938 household data and 44 rural collective economy data were retained for analysis. The geographical distribution of the household survey samples is as follows: Ningbo (208 famers), Hangzhou (165 farmers), Jinhua (171 farmers), Wenzhou (100 farmers), Taizhou (81 farmers), Huzhou (74 farmers), Quzhou (62 farmers), and Shaoxing / Jiaxing (78 farmers).

2.3 Variable selection

2.3.1 Dependent variable

The farmers' sense of spiritual gain is used as the dependent variable. It refers to the positive subjective feeling and emotional experience that individuals derive from the process of spiritual life development (Xie, 2024). This sense of gain primarily originates from the satisfaction after obtaining current spiritual and cultural resources, products and services (Xiang and Ma, 2022). Conceptually, it is a multidimensional construct that can be examined through several dimensions (Table 1). First, it is manifested as people's satisfaction in participating in spiritual and cultural life. Referring to the research by Fu and Gao (2022), this dimension is measured by farmers' satisfaction with rural cultural activities. Second, it is embodied in individuals' satisfaction with public cultural services. As the sole demonstration zone for the construction of common prosperity in China, on July 20, 2021, the Zhejiang Provincial government issued the Implementation Plan for Zhejiang High-quality Development and Construction of Common Prosperity Demonstration Zone. The plan emphasizes that the connotation of the construction of spiritual life lies in "highlighting the beauty of humanity and striving to become a provincial example of universal spiritual prosperity." Subsequently, the "Action Plan on High-quality Building a New Era Cultural Highland and Promoting the Construction of a Common Prosperity Demonstration Area (2021–2025)" was introduced to advance the upgrading of public cultural services and enrich spiritual life. Based on Shang and Lu (2022) research, this dimension is evaluated through farmers' satisfaction with cultural and sports facilities, as well as and library services in the village. Finally, the sense of spiritual gain is also manifested as people's positive emotions of spiritual pleasure and satisfaction (Xie, 2024). Referring to the research by Shi et al. (2024) and Liu (2022), this dimension captures farmers' cultural identity and confidence, as well as their satisfaction with spiritual life.

This article employs simple summation and the graded item response theory model, respectively, to construct the index of the sense of spiritual gain. First, the simple summed sense of spiritual gain index represents the original score of the farmers' sense of spiritual gain. However, since the reliability of the summed score depends on the error score, this method has many limitations (Huo et al., 2021). To address this, the graded item response theory model was adopted, treating farmers' sense of spiritual gain as a latent variable. The graded item response theory model includes the two-parameter logistic model (2PL) and the three-parameter model (3PL). In this study, the 2PL model was applied, as it accounts for both item discrimination and difficulty parameters. Since the responses to the five items are ordinal, ranging from 1 to 5, the graded item response theory model is appropriate for this analysis. Through hypothesis testing and rationality judgment of the parameter interval values, the Bayesian expected posterior estimation method was employed to estimate the latent trait (Theta) of the farmers' sense of spiritual gain, and the standardized index was subsequently derived. In the subsequent regression analysis, the index measured by IRT will serve as the dependent variable for the benchmark regression, while the aggregated score index will be used as the dependent variable for robustness checks.

2.3.2 Independent variable

Literature shows that collective economic income is commonly used to represent the development of the collective economy (Sun and Zhang, 2022). However, the total collective economic income represents the "receivables," and not all of it can be freely allocated by the rural collective economic organization (Lu and Yang, 2022). Therefore, this study employs the logarithm of collective economic profit to characterize the development level of the rural collective economy, as it more accurately reflects its profitability.

To examine the influence of rural collective economy on farmers' sense of spiritual gain, variables were constructed to capture the cultural and public service functions of the collective economy. The cultural function is reflected in the collective economy's provision of cultural activities for farmers, promotion of new civilized practices and healthy lifestyles, fostering of farmers' spiritual emotions, and contribution to their spiritual enrichment. This function is measured by four indicators, including whether the village collective economy provides birthday welfare benefits, cultural and educational subsidies, and free hair-cutting services for its members.

The public service function is reflected in the supplementary role of the collective economy in providing inclusive activities such as pension, education, medical care, and hardship relief for farmers (members) compared to basic public services (Tang, 2020). This function helps alleviate the livelihood concerns of the elderly and impoverished in the village, thereby enhancing their sense of spiritual gain. The public service function is measured using four indicators: whether the village collective economy provides hardship assistance, medical and health support, elderly care services, and infrastructure construction funding.

The measurement indicators for the public service functions and cultural functions of the rural collective economy are binary variables (coded as 1 or 0), which indicate whether expenditures have been incurred or activities have been carried out. In agricultural economics and rural studies, the summation method is a commonly used approach for processing such binary variables. For example, in studies on the impact of agricultural socialized services on farmers' production decisions, scholars usually sum up the number of services adopted by farmers in six links—seedling raising, land preparation, transplanting, fertilization, pesticide application, and harvesting (each service is assigned a value of 0 or 1)—and use the total score (ranging from 0 to 6) as the measurement indicator (Li et al., 2025; Chen et al., 2024). However, simple summation may result in reduced construct validity of the independent variables. To address this, exploratory factor analysis (EFA) was used to refit the two sets of function indicators, so as to obtain function indices with greater statistical and theoretical rationality. In the subsequent benchmark regression, this study adopts the factor-based indices of the rural collective economy, while the robustness analyses rely on the two function indices derived from the summation scores. Additionally, farmers' subjective evaluations of the cultural and public service functions of the rural collective economy were employed as alternative variables for robustness testing.

To examine the heterogeneity in the welfare-enhancing function resulting from the operation mode of the rural collective economy, this study designs the variables for independent operation mode and joint operation mode. Wang and Xia (2022) argue that the premise of the independent operation mode lies in the collective ownership of land and accumulated assets. Under this mode, collective economic organization independently manage collective resource assets, and strengthens rural collective economic strength through investment attraction and project construction. In previous studies, per capita operating income was utilized as an indicator to represent the independent operation mode. However, this study proposes a more precise approach by designing a dummy variable that accounts for the proportion of operating income. That is, when the proportion of operating income is greater than 50%, the rural collective economic mode is classified as operating under the independent operation mode.

The joint operation mode refers to a development strategy employed by rural collective economic organizations that face constraints such as limited resources, insufficient funds, restricted geographical space, and challenges in management and protection. Under these limitations, it becomes difficult for these organizations to realize the optimal combination of production factors in market competition. Consequently, they collaborate with other villages and towns to integrate resources and pursue development. Xu (2023) terms this the group mode and suggests using per capita investment income as its indicator. However, this study argues that per capita investment income does not adequately capture the specific characteristics of the joint operation mode. Instead, a dummy variable is employed to more accurately represent this mode. Specifically, when the investment income accounts for 20% or more of total collective revenue, the rural collective economic mode is classified as the joint operation mode. From the company operation and finance perspective, an external investment proportion of 20% or higher is generally considered to exert a significant impact. In the absence of detailed data on the exact investment proportion, this study uses the proportion of investment income as a proxy.

Meanwhile, this study uses a threshold of rural collective economic profit exceeding 1 million yuan to examine the heterogeneous effects of collective economies with different profit levels on enhancing farmers' sense of spiritual well-being. In general, higher profit levels enable greater capital investment and expansion of supporting activities in public and cultural services. As a result, the public service and cultural functions of the rural collective economy are strengthened, which in turn enhances its impact on farmers' sense of spiritual well-being.

2.3.3 Control variables

Drawing on previous studies (Luan and Zhang, 2024; Lu and Yang, 2022), this study includes the following control variables: household head characteristics (age, gender, education level and health level), family factors (family income, household size, family living space, social capital, home durable goods) and village-level factors (the number of households in the village, the education level of rural collective economic managers). In addition, regional dummy variables are incorporated to control for regional fixed effects. Descriptive statistics for all variable are shown in Table 2.

2.4 Research model

2.4.1 Graded response model

Based on five observed indicators, farmers' sense of spiritual gain is conceptualized as a latent construct. Compared with the simple summation of item scores, the Item Response Theory (IRT) model provides a more rigorous and reliable approach to accounting for measurement errors. Since the measurement indicators are rated on a five-point ordinal scale (1–5), this study adopts the Graded Response Model (GRM) to estimate the index of sense of spiritual gain. The GRM is a latent trait model specifically designed for ordered polytomous response items and has been widely applied in assessing individuals' latent characteristics (Samejima, 1996).

In the GRM framework, θ_i denotes the latent level of sense of spiritual gain for the i-th farmer, and k represents the response category, taking values from 1 to 5. The probability that individual i, with a latent trait level of θ_i, selects a response category of k or higher on item j is defined as follows:

$$P\left(Y_{ij} \geq k \middle| \theta_i\right) = \frac{\exp\left[\alpha_i\left(\theta_i - b_{jk}\right)\right]}{1+\exp\left[\alpha_i\left(\theta_i - b_{jk}\right)\right]}, \theta \sim N\left(0,1\right) \quad (1)$$

TABLE 1 Measurement of the dependent variable and its descriptive statistics.

Variable	Variable definitions	Mean	SD
Satisfaction with rural cultural activities	Satisfaction score with rural cultural activities, ranging from 1 (very dissatisfied) to 5 (very satisfied).	3.770	0.747
Evaluation of rural residents' cultural confidence	Satisfaction score of rural residents' cultural confidence, ranging from 1 (very dissatisfied) to 5 (very satisfied).	3.807	0.734
Satisfaction with the rural spiritual life	Satisfaction score with the spiritual life in rural areas, ranging from 1 (very dissatisfied) to 5 (very satisfied).	3.756	0.758
Satisfaction with the sports and fitness facilities	Satisfaction score with sports and fitness facilities in rural areas, ranging from 1 (very dissatisfied) to 5 (very satisfied).	3.647	0.871
Satisfaction with the library services in the village	Satisfaction score with sports and fitness facilities in rural areas, ranging from 1 (very dissatisfied) to 5 (very satisfied).	3.640	0.768
IRT Estimated Value of Spiritual Sense of Gain	Standardized scores of latent variable values estimated using the item response theory (IRT) method.	0.409	0.194
Count Score of Spiritual Sense of Gain	Sum of scores from the five indicators	18.621	3.138

In Equation (1), α_j represents the discrimination parameter of item j, while b_{jk} denotes the threshold (difficulty) parameter corresponding to response category k of item j. The threshold parameters for each item are assumed to increase monotonically, such that $b_{j1} < b_{j2} < b_{j3} < b_{j4}$. After estimating these parameters, the Bayesian expected posterior estimation method is employed to obtain the fitted latent trait value (θ) for each individual.

2.4.2 Ordinary least squares model

The sense of spiritual gain estimated through the IRT model is treated as a continuous variable. To further examine the enhancing effect of the rural collective economy on farmers' sense of spiritual gain, this study employs a linear regression model for empirical analysis.

$$Sense_{gaini} = \beta_0 + \beta_1 RCE_i + \sum \beta_m CV_i + \epsilon_i \quad (2)$$

In Equation (2), $Sense\_gain_i$ is the dependent variable, which represents the level of sense of spiritual gain of the i-th household. RCE_i is the core explanatory variable, which represents the development level of the collective economy of the village where the i-th household is located, as well as the cultural and public service functions provided by the collective economy. Correspondingly, β_1 denotes the parameter estimate value of the core explanatory variable.

TABLE 2 Definitions and descriptive statistics of independent variables.

Variable	Variable definitions	Mean	SD
Rural collective economic strength	Profit in the previous year (RMB, logarithm taken)	12.883	1.325
The cultural function of the rural collective economy	Provision of birthday benefits to members (1 = Yes, 0 = No)	0.199	0.399
	Provision of cultural and educational benefits to members (1 = Yes, 0 = No)	0.142	0.349
	Provision of free haircut services to members (1 = Yes, 0 = No)	0.747	0.435
The public service function of the rural collective economy	Provision of assistance to members in case of difficulties (1 = Yes, 0 = No)	0.795	0.404
	Provision of medical and health expenditures for members (Yes = 1, No = 0)	0.788	0.409
	Whether home-based elderly care services in the village are supported (Yes = 1, No = 0)	0.806	0.395
	Whether expenditure is incurred for village infrastructure construction (Yes = 1, No = 0)	0.880	0.325
Public service perception	Evaluation of sanitary toilets and waste disposal	7.441	1.501
Cultural service perception	Farmers' evaluation of the cultural auditorium activities in the village	3.760	0.757
Independent operation mode	If collective economic revenue accounts for more than 50%, the value is 1	0.160	0.367
Joint operation mode	If the return on investment is greater than 20%, the value is 1.	0.145	0.352
Age of respondents	Respondent's actual age	51.702	14.128
Gender of respondents	Males = 1, female = 0	0.619	0.486
Education level of respondents	Respondent's years of education	10.277	4.192
Health level of respondents	Healthy = 1, unhealthy = 0	0.783	0.413
Household size	The family population is greater than five people = 1; the family population is less than or equal to five people = 0	0.364	0.481
Family income	Household total income value for the previous year (RMB)	11.847	0.717
Social capital	The number of close connected families (Households)	5.355	4.581
Family living space	Family living area (m^2)	153.474	107.609
Home durable goods	Whether the family owns cars, computers, motorcycles, etc.	2.596	0.753
The number of households in the village	Number of Households in the village (Households, logarithm)	6.287	0.508
The Educational level of collective economic managers	College degree or above = 1; College degree below = 0	0.721	0.449
Local dummy variable	City dummy variable	——	——

CV_i refers to a series of control variables, including the personal characteristics of the respondent, family factors, village factors, among others. β_m represents the parameter estimate value of these control variables, while $\vartheta_i$is the random error term.

In the robustness analysis, the summed score is adopted as an alternative measure of the sense of spiritual gain. To further validate the findings, this study employs both the Ordered Probit model and the Tobit model for parameter estimation, examining the effects of the cultural and public service functions of the rural collective economy on farmers' sense of spiritual gain.

3 Results and analyses

3.1 Validation of the spiritual sense of gain scale

To assess the internal consistency of the measurement indicators for the spiritual sense of gain, this study employed classical reliability testing methods. The results show that Cronbach's α coefficient is 0.867, exceeding the commonly accepted threshold of 0.7, indicating strong internal consistency among the indicators. The overall Kaiser–Meyer–Olkin (KMO) value is 0.844, with individual KMO values ranging from 0.787 to 0.902. Bartlett's Test of Sphericity is significant at the 0.000 level (χ^2 = 2692.015), confirming that the data are suitable for factor analysis. An Exploratory Factor Analysis (EFA) was then conducted to identify the number of latent factors underlying the five measurement indicators. The results show that the eigenvalue of the first factor is 2.912, while that of the second is 0.114, yielding a ratio of 25.544 between them. These findings indicate that the five indicators load on a single latent factor, demonstrating strong construct unidimensionality.

In applying the Item Response Theory (IRT) model, it is necessary to verify monotonicity and local independence. The Mokken Scale Procedure was employed to test these assumptions. The results show that Loevinger's H coefficients for the five indicators range from 0.502 to 0.669, all exceeding the critical threshold of 0.3, indicating that the data meet the requirements for IRT modeling of the spiritual sense of gain.

3.2 Benchmark regression analysis

Table 3 shows the benchmark regression results on the impact of the rural collective economy on farmers' sense of spiritual gain. Columns (1)–(3) report the ordinary least squares (OLS) estimation results, showing that the development of the rural collective economy significantly enhances farmers' sense of spiritual gain. From the action path perspective, both the public service function and cultural function of the rural collective economy exert significant positive effects, with results statistically significant at 1%. Due to missing data of a few control variables, the sample size of models (4)–(9) decreases to 918. Columns (4) to (6) report the estimation results after incorporating control variables. Even after controlling for individual, family, village and regional factors, the development of the rural collective economy remains positively and significantly associated with farmers' sense of spiritual gain, mainly through its cultural and public service functions. Moreover, since the dependent variable derived from the summation method can be regarded as an ordinal variable ranging from 7 to 25, this study also employs the Ordered Probit model for parameter estimation. The corresponding results, shown in columns (7) to (9), confirm that the effects of the key explanatory variables remain statistically significant. In general, the findings suggest that in rural societies, the more developed rural collective economy is more capable of fulfilling cultural and public service roles, thereby enhancing the farmers' spiritual satisfaction.

3.3 Robustness check

To verify the robustness of the regression results, this study conducts a series of tests by successively replacing the estimation method, dependent variable, and core explanatory variables. Since the dependent variable ranges from 7 to 25, it can also be regarded as truncated data. Therefore, in Table 4 columns (1) to (3) simultaneously present the Tobit regression results. Columns (1) to (3) in Table 3

TABLE 3 The influence of rural collective economy on farmers' sense of spiritual gain.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	OLS	OLS	OLS	OLS	OLS	OLS	Ordered Probit	Ordered Probit	Ordered Probit
Collective economic profits	——	——	0.019*** (0.005)	——	——	0.018*** (0.006)	——	——	0.116*** (0.035)
Public service function	0.034*** (0.007)	——	0.029*** (0.007)	0.034*** (0.006)	——	0.024*** (0.006)	0.178*** (0.038)	——	0.123*** (0.039)
Cultural function	——	0.017** (0.006)	0.008 (0.007)	——	0.046*** (0.010)	0.037*** (0.010)	——	0.232*** (0.055)	0.185*** (0.056)
Age	——	——	——	0.001** (0.000)	0.001** (0.000)	0.001** (0.000)	0.007** (0.003)	0.005* (0.003)	0.005 (0.003)
Gender	——	——	——	−0.007 (0.013)	−0.003 (0.013)	−0.001 (0.013)	−0.070 (0.073)	−0.021 (0.074)	−0.040 (0.074)
Education	——	——	——	0.003* (0.002)	0.003** (0.002)	0.002 (0.002)	0.024** (0.010)	0.025** (0.010)	0.019* (0.011)
Health	——	——	——	−0.049*** (0.017)	−0.065*** (0.017)	−0.059*** (0.017)	−0.341*** (0.097)	−0.427*** (0.099)	−0.401*** (0.100)
Household size	——	——	——	−0.011 (0.013)	−0.019 (0.013)	−0.015 (0.012)	−0.075 (0.073)	−0.120 (0.074)	−0.100 (0.074)
Income	——	——	——	0.033*** (0.009)	0.040*** (0.002)	0.037*** (0.009)	0.189*** (0.052)	0.226*** (0.050)	0.218*** (0.052)
Social capital	——	——	——	0.005** (0.001)	0.006*** (0.002)	0.006*** (0.002)	0.034*** (0.009)	0.040*** (0.010)	0.038*** (0.010)
Durable goods	——	——	——	0.006 (0.009)	0.002 (0.009)	0.009 (0.009)	0.026 (0.053)	0.002 (0.052)	0.039 (0.052)
Number of households	——	——	——	−0.001 (0.014)	0.017 (0.014)	0.008 (0.015)	0.019 (0.087)	0.109 (0.084)	0.053 (0.088)
Managers	——	——	——	0.057*** (0.016)	0.052*** (0.016)	0.039** (0.017)	0.449*** (0.096)	0.422*** (0.095)	0.343*** (0.102)
Area	——	——	——	control	control	control	control	control	control
_cons	0.409*** (0.006)	0.409*** (0.006)	0.164*** (0.059)	−0.102 (0.151)	−0.240* (0.143)	−0.399** (0.156)	——	——	——
N	939	939	939	918	918	918	918	918	918
F Value/Wald chi^2	25.65	6.65	10.87	12.13	11.48	12.18	200.07	198.48	214.79
R2/Pseudo R^2	0.030	0.008	0.050	0.179	0.181	0.206	0.046	0.046	0.052

Robust standard errors are in brackets; *, **, and ***indicate significance at the 10.5, and 1% levels, respectively.

report the Tobit regression results. Columns (4) to (6) present the OLS estimation results when the explained variable is replaced by the summed score, while columns (7) to (9) display the estimation results obtained when the core explanatory variable is replaced with its summed score value. Columns (10) to (12) further report the results obtained by substituting the core explanatory variables with farmers' subjective evaluations of the rural collective economy's public service and cultural functions. Specifically, the public service function is measured by farmers' assessments of the collective economy's role in providing hardship relief, medical assistance, and elderly mutual aid. In column (11), the cultural function is measured through farmers' evaluations of the collective economy's contributions to organizing cultural activities, promoting civilized behavior, fostering community cohesion, and encouraging healthy lifestyles. All items are rated on a five-point scale (1–5), and total scores are calculated by summing the item values. Furthermore, to address potential issues such as serial correlation and heteroscedasticity among the regression samples, this study employs the Feasible Generalized Least Squares (FGLS) approach for more robust parameter estimation. The results remain consistent with those of the baseline regression but are not reported in Table 3 due to space limitations.

The results show that the estimated coefficients of the rural collective economy remain significantly positive across all models, indicating that the cultural and public service function of the rural collective economy significantly increase farmers' sense of spiritual gain.

3.4 Empirical results of IV method

There may be a bidirectional causal relationship between the development of the rural collective economy and the welfare level of farmers. Additionally, the model may omit important variables, such as unobservable or unmeasurable variables. To address potential endogeneity, this study employs the instrumental variable method. Following the practice of Sun and Zhang (2022), the average collective economic profit of other villages in the same region is used as an instrumental variable for the collective economic profit of the village. Similarly, the average cultural function index and public service function index of other villages are used as instrumental variables for the collective functions. The development and functional performance of the collective economy in neighboring villages can exert a demonstrative or spillover effect on the development of a given village's collective economy. However, they are unlikely to directly influence the sense of spiritual gain of farmers in that village. Therefore, these instrumental variables meet the selection criteria. The estimation results presented in Columns (2)–(4) of Table 5 show that both the under-identification test (LM) and the weak instrument test (Wald F) significantly reject the null hypothesis, confirming the validity of the selected instruments and indicating no weak instrument problem.

On the other hand, this study applies the heteroscedasticity-based instrumental variable approach proposed by Lewbel (2012). Specifically, when the residuals from regressing the endogenous variable on the model's exogenous variables exhibit heteroscedasticity, valid instruments can be constructed by interacting these residuals with the demeaned exogenous variables. The main advantage of this method is that it allows model identification even in the absence of external instrumental variables, by exploiting the heteroscedasticity of endogenous variables or measurement errors to generate internal instruments. The Breusch–Pagan test results (p = 0.000) confirm significant heteroscedasticity in the residuals from the first-stage regression, thereby meeting the necessary condition for applying the Lewbel (2012) approach. The diagnostic test results for the instrumental variables are as follows: the LM statistic is significant at

TABLE 4 Results of the robustness test.

Variable	(1) Tobit	(2) Tobit	(3) Tobit	(4) OLS_ Ycount	(5) OLS_ Ycount	(6) OLS_ Ycount	(7) OLS_ Xcount	(8) OLS_ Xcount	(9) OLS_ Xcount	(10) R_PSF	(11) R_CF	(12) R_ PSC
Collective economic profits	——	——	0.266*** (0.100)	——	——	0.276*** (0.095)	——	——	0.017*** (0.006)	——	——	0.022*** (0.004)
Public service function	0.536*** (0.110)	——	0.363*** (0.109)	0.490*** (0.105)	——	0.329*** (0.105)	0.010 (0.013)	——	0.018** (0.008)	0.016*** (0.003)	——	0.008** (0.004)
Cultural function	——	0.789*** (0.165)	0.650*** (0.165)	——	0.702*** (0.154)	0.576*** (0.155)	——	0.054*** (0.011)	0.041*** (0.012)	——	0.015*** (0.003)	0.012*** (0.003)
Respondents characteristics	control	control	control	control	control	control	control	control	control	control	control	control
Family characteristics	control	control	control	control	control	control	control	control	control	control	control	control
Village characteristics	control	control	control	control	control	control	control	control	control	control	control	control
Regional characteristics	control	control	control	control	control	control	control	control	control	control	control	control
_cons	9.700*** (2.684)	7.252*** (2.565)	4.894* (2.796)	10.03*** (2.483)	7.889*** (2.358)	5.367** (2.604)	−0.163 (0.169)	−0.334** (0.147)	−0.399** (0.156)	−0.816*** (0.119)	0.743*** (0.117)	−1.003 (0.125)
N	918	918	918	918	918	918	918	918	918	918	918	918
F Value	11.79	11.64	12.04	13.14	13.16	13.49	11.81	11.62	11.95	54.52	55.90	59.39
Pseudo R^2/R2	0.043	0.044	0.049	0.191	0.196	0.216	0.177	0.179	0.194	0.531	0.540	0.556

Robust standard errors are in brackets; *, **, and ***indicate significance at the 10.5, and 1% levels, respectively.

the 1% level, rejecting the null hypothesis of under-identification; the Cragg–Donald Wald F-statistics all exceed the critical value of 10 (Staiger and Stock, 1997), indicating the absence of weak instrument problems; the Hansen J test yields a p-value greater than 0.05, supporting the null hypothesis that all instruments are exogenous.

The IV–2SLS regression results further show that the profit level of the village collective economy, as well as its cultural and public service functions, exerts a significant positive effect on farmers' sense of spiritual gain. These findings suggest that the development of the rural collective economy significantly enhances farmers' sense of spiritual gain. Overall, the finding supports the conclusion that the benchmark regression results in this study are both reasonable and robust.

3.5 Placebo test

To ensure that the effects of the cultural and public service functions of the rural collective economy on farmers' sense of spiritual gain are not driven by random factors, this study constructs pseudo-function variables of the rural collective economy through 1,000 random samplings and performs a placebo test by re-estimating the regressions. As shown in Figure 1, the estimated coefficients of the pseudo-explanatory variable for the cultural function are largely centered around zero, deviating from the true coefficient (0.044). Most p-values exceed 0.1, indicating no statistical significance at the 10% level. Similarly, the pseudo-coefficients for the public service function are also concentrated around zero and deviate from the true coefficient (0.031), with most p-values again exceeding 0.1. These findings confirm that the cultural and public service functions of the rural collective economy significantly promote farmers' sense of spiritual gain and, to some extent, exclude the influence of random factors (Figure 2).

3.6 Heterogeneity analysis

Different operation modes of rural collective economies may lead to variations in their scale and profitability, which in turn affect the effectiveness of their functions in enhancing farmers' sense of spiritual gain. However, the relatively small village-level sample in this study limits the statistical power of the heterogeneity analysis across different operation modes. Compared with the group regression approach, the interaction-variable method adopted in this study offers greater statistical efficiency. Specifically, the operation modes are

TABLE 5 Endogeneity test: instrumental variable method.

Variable	Sense of spiritual gain	Sense of spiritual gain	Sense of spiritual gain	Sense of spiritual gain	Sense of spiritual gain	Sense of spiritual gain
Collective economic profits	0.060*** (0.018)	——	——	0.075*** (0.018)	——	——
Public service function	——	0044*** (0.012)	——	——	0.027* (0.014)	——
Cultural function	——	——	0.043*** (0.012)	——	——	0.036* (0.020)
Respondents characteristics	control	control	control	control	control	control
Family characteristics	control	control	control	control	control	control
Village characteristics	control	control	control	control	control	control
Area effect	control	control	control	control	control	control
Weak identification test Wald F	56.331 [10]	294.434 [10]	565.804 [10]	10.209 [10]	21.226 [10]	16.145 [10]
Underidentification test LM	54.243*** (0.000)	226.861*** (0.000)	355.077*** (0.000)	27.808*** (0.000)	47.106*** (0.000)	28.198*** (0.000)
Hansen J statistic	——	——	——	0.07	——	——
Hansen J statistic	——	——	——	——	0.05	——
Hansen J statistic	——	——	——	——	——	0.07
Instrumental variable 1	0.675*** (0.090)	——	——	——	——	——
Instrumental variable 2	——	−1.567*** (0.091)	——	——	——	——
Instrumental variable 3	——	——	−2.092*** (0.077)	——	——	——
N	918	918	918	918	918	918
R2	0.459	0.494	0.515	0.371	0.479	0.476

Robust standard errors are in brackets; *, **, and ***indicate significance at the 10.5, and 1% levels, respectively.

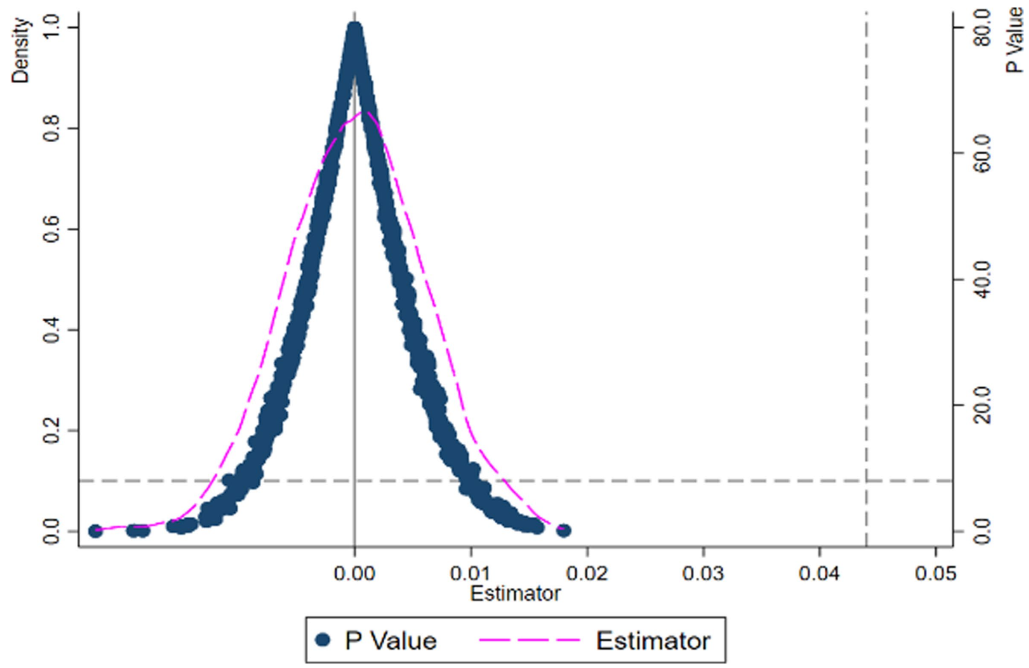

FIGURE 1
Placebo test results for the cultural function.

categorized into independent operation and joint operation. Corresponding dummy and interaction variables are constructed to examine how these modes moderate the effects of the cultural and public service functions of rural collective economies on farmers' sense of spiritual gain. Moreover, collective economies of different scales also vary in their performance of cultural and public service functions. In general, larger collective economies possess stronger economic capacity and are better able to provide members with higher-quality cultural and public services. Based on the distribution of the surveyed villages' economic strength, this study sets an annual operating profit of RMB 1 million as the threshold: collective economies with annual operating profits above RMB 1 million are defined as large-scale, and those below this level as small-scale.

In Model (1) of Table 6, the estimated coefficient of the interaction term between independent operation and public service function is insignificant. This suggests that the combination of the public service function and the independent operation mode do not generate a synergistic effect; in other words, the independent operation mode fails to strengthen the positive influence of the public service function on farmers' sense of spiritual gain. Results from Model (2) indicate that the interaction term between the independent operation mode and the cultural function is significantly positive. This finding implies that, under the independent operation mode, the positive effect of the cultural function on farmers' spiritual gain is further enhanced. The underlying logic is that the independent operation mode provides more flexible institutional arrangements and organizational space for cultural activities, enabling them to better align with villagers' needs and thus fostering a stronger sense of identity and spiritual fulfillment. Findings from Models (3) and (4) show that the estimated coefficient of the joint operation mode is significantly positive. This suggests that the joint operation mode—such as inter-village cooperation, resource sharing, and collective development—directly promotes farmers' sense of spiritual gain by improving collective scale efficiency and governance capacity. However, the interaction terms between the joint operation mode and both the cultural and public service functions are insignificant, indicating that the combination of the joint operation mode with these functions does not produce additional synergistic effects. Two main reasons may explain this result. First, the core advantages of the joint operation mode lie in the integration of economic resources and the enhancement of organizational efficiency, while its achievements in integrating non-economic functions—such as public service delivery and cultural service optimization—remain limited. Second, the relatively complex organizational structure of the joint operation mode may hinder the deep incorporation of cultural activities and public services into collective operations, thereby weakening their capacity to enhance farmers' sense of spiritual gain.

Results from Model (5) in Table 6 indicate that the estimated coefficient of the public service function is significantly negative. This suggests that in small-scale collective economies, the public service function has a significant adverse effect on farmers' sense of spiritual gain. A plausible explanation is that small-scale collective economies often have limited resources, which may lead to insufficient service coverage, poor service quality, or a mismatch between service goals and villagers' actual needs. Consequently, these shortcomings prevent public service activities from effectively enhancing farmers' sense of spiritual gain. In contrast, the estimated coefficient of the collective economy scale variable is significantly positive, indicating that larger-scale collective economies are better able to enhance farmers' sense of spiritual gain overall. This may reflect economies of scale, whereby expansion strengthens organizational coordination and improves governance mechanisms for public affairs—such as decision-making efficiency and fairness in resource allocation—thus providing a stronger institutional

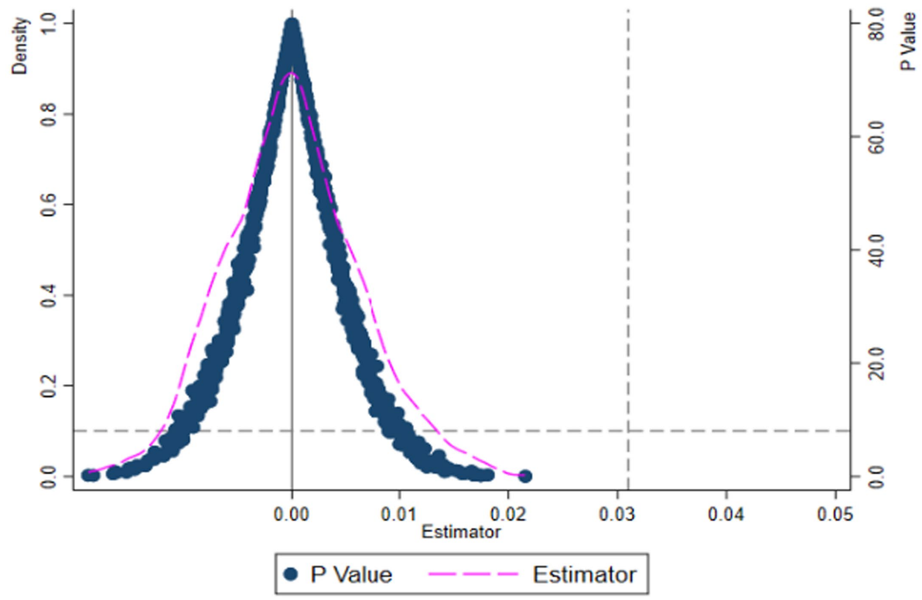

FIGURE 2
Placebo rest for the public service function.

foundation for improving farmers' sense of spiritual gain. Moreover, the estimated coefficient of the interaction term between the public service function and the scale variable is significantly positive, implying that the scale of the collective economy amplifies the positive impact of the public service function on farmers' sense of spiritual gain. In large-scale collective economies, greater financial capacity, broader service scope, higher service quality, and greater fairness collectively contribute to a more substantial improvement in farmers' sense of spiritual gain.

Results from Model (6) show that the interaction term between the cultural function and the collective economy scale is insignificant, indicating no synergistic effect between these two factors. In other words, the influence of the cultural function on farmers' sense of spiritual gain is independent of the scale of the collective economy. Whether the collective economy is large or small, the cultural function's impact on farmers' sense of spiritual gain remains essentially unchanged.

4 Discussion

First, the rural collective economy not only promotes farmers' objective well-being, but also effectively enhances farmers' subjective well-being. Literature shows that its development effectively increases farmers' income (Luan and Zhang, 2024), improves consumption level and rural public service level, and enhances overall well-being. In addition, Sun and Zhang (2022), using the total income index of the collective economy, found that its development improves public services and non-agricultural employment, further improving the farmers' life satisfaction. However, their analysis focuses mainly on total revenue and assets to assess the development of rural collective economy, overlooking its specific functional dimensions. Moreover, while investigating subjective well-being, most studies fail to consider the sense of gain in spiritual and cultural life. In contrast, this study investigates the causal relationship between the cultural and public service functions of the rural collective economy and farmers' sense of spiritual gain.

This study finds that the development level of the rural collective economy, as well as its cultural and public service functions, significantly enhances farmers' sense of spiritual gain. As a form of rural public ownership, the new-type rural collective economy plays a vital role in improving the well-being of rural residents, particularly by strengthening their sense of gain. Evidence from Zhejiang Province indicates that rural collective economies should fully leverage their capacity for public service provision and cultural cohesion within the limits of their development conditions. This practice is consistent with the core value guiding the development of rural collective economies across China—namely, "providing basic public goods and spiritual and cultural services"—and is largely unaffected by regional development disparities. It also provides valuable implications for other regions in China, especially rural areas in economically advanced eastern coastal provinces such as Jiangsu, Guangdong, and Shandong, where collective economies are more developed and thus offer stronger reference value. Li and Sun (2025), in their study of rural collective economies in Shandong Province, similarly found that collective economic development significantly improves farmers' subjective well-being. For less developed regions (e.g., rural areas in central and western China), the core logic of Zhejiang's experience—"the development and benefit-sharing of rural collective economies should be based on people's aspirations for a better life"—offers a concept worthy of adaptation. However, specific practices should be aligned with the operational capacities and resource endowments of local collective economies. Luo (2023), using a national sample of rural collective economies, also found that the positive effect of collective economic development on farmers' happiness in central and western regions has been significantly strengthened, highlighting the greater importance of collective economy development for enhancing farmers' well-being in these areas.

TABLE 6 Results of heterogeneity analysis based on operation mode and operation scale.

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Collective economic profits	0.021*** (0.004)	0.021*** (0.004)	0.020*** (0.004)	0.020*** (0.004)	0.008* (0.004)	0.013 (0.009)
Public service function	0.000 (0.006)	——	0.000*** (0.005)	——	−0.013** (0.006)	
Cultural function	——	0.010** (0.005)	——	0.012* (0.006)		0.018** (0.008)
the independent operation mode	−0.008 (0.019)	−0.015 (0.017)	——	——		
Independent operation × Public service function	0.020 (0.020)	——	——	——		
Independent operation × Cultural function	——	0.056** (0.023)	——	——		
The joint operation mode	——	——	0.079*** (0.025)	0.050** (0.017)		
Joint operation × Public service function	——	——	−0.052 (0.046)	——		
Joint operation × Cultural function	——	——	——	−0.004 (0.017)		
operation scale					0.055*** (0.012)	0.055*** (0.012)
operation scale × Public service function					0.045*** (0.010)	
operation scale × Cultural function						−0.009 (0.011)
Respondent characteristic	control	control	control	control	control	control
Family characteristics	control	control	control	control	control	control
Village characteristics	control	control	control	control	control	control
Regional characteristics	control	control	control	control	control	control
_cons	−0.866*** (0.112)	−0.947*** (0.105)	−0.747*** (0.127)	−0.784*** (0.133)	−0.651*** (0.125)	−0.695*** (0.125)
N	918	918	918	918	918	918
R2	0.490	0.503	0.500	0.501	0.510	0.506

Robust standard errors are in brackets; *, **, and ***indicate significance at the 10.5, and 1% levels, respectively.

In addition, Xu (2023) believes that the operation mode of the collective economy influences the development of rural collective economy, which, in turn, affects their capacity to improve farmers' well-being. By distinguishing between independent and joint operation modes, this article argues that the independent operation mode is more effective in in enhancing the welfare impact of rural collective economies, particularly through their cultural and public service functions. In contrast, the joint operation mode struggles to effectively fulfill its public service function. These findings markedly diverge from Xu (2023) conclusions.

5 Conclusion

This study utilizes rural survey data from Zhejiang Province to examine the relationship between the development of rural collective economy and farmers' sense of spiritual gain. It focuses on the mechanism of cultural and public service functions in enhancing farmers' well-being, and explores the differential impacts of various operational modes of collective economy impact on the farmers' well-being. The results show that the level of development of the rural collective economy has a significant positive impact on farmers' sense of spiritual gain. Specifically, this impact is achieved through cultural and public service functions. The mediation effect results show that the rural collective economy realizes the enhancing effect on farmers' spiritual life through strengthening the perception of cultural activities and public services. Furthermore, from the operation mode perspective, the independent operation mode of rural collective economies exhibits a significant synergistic effect with cultural functions in enhancing farmers' sense of spiritual gain. In addition, considering differences in operation scale, public service functions generate a significant synergistic effect with larger-scale collective economies.

The research findings provide valuable implications for government departments aiming to advance the rural collective economic reform. First, in advancing the reform of the rural collective economy, it is recommended to strengthen its foundational role in developing public infrastructure—such as village medical care, education, and other supportive services—beyond the traditional profit distribution to members. At the same time, the collective economy's function in enriching rural cultural life and fostering emotional bonds among villagers should be further enhanced.

Second, the benefit-sharing mechanism between the village collective economy and its members should be differentiated and optimized according to varying levels of economic strength and development scale. For collective economies with strong financial capacity and large development scale, their benchmarking role in public service provision and cultural development should be fully utilized. In public service development, these collectives should be encouraged to establish rural welfare funds to provide long-term and stable public welfare support for their members. They should also promote joint development with surrounding villages through cross-village cooperation and regional coordination, thereby advancing the equalization of regional public services. In cultural development, strong collectives should collaborate with universities and cultural or tourism enterprises to integrate agriculture, culture, and tourism, enrich rural cultural products, and achieve cultural value-added benefits. They should also promote digital cultural platforms to broaden cultural spaces. For collective economies with weaker financial capacity and smaller development scale, priority should be given to applying for government financial subsidies and leveraging cultural and public service functions through assistance mechanisms. For instance, such collectives can apply for government funding to build village history museums, farmers' reading rooms, and cultural squares to enrich cultural activities and enhance villagers' cultural identity and emotional cohesion. In terms of public services, these collectives should actively promote the "village–enterprise co-construction and win–win" mechanism, guiding leading agricultural enterprises, cooperatives, and other social actors to participate in grassroots development. Through project co-construction and industrial feedback, they can improve public service provision and strengthen farmers' sense of gain.

Third, to overcome the limitations in innovation among different models of rural collective economies, efforts should focus on exploring how public services and cultural functions can enhance farmers' sense of gain while simultaneously improving profitability and operational efficiency. For collective economies adopting the independent operation model, it is essential to strengthen internal control systems and improve risk management in market operations. Introducing a points-based system can also encourage villagers' participation in decision-making and supervision of public affairs. For collective economies operating under the joint model, priority should be given to resolving issues related to decision-making and profit distribution among participating entities. In addition, promoting cultural activities in co-constructed villages and fostering regional cultural sharing and identity are crucial. At the same time, joint initiatives should be undertaken to establish regional public service development funds to broaden the beneficiary base of public services.

This study has several limitations. First, it relies on cross-sectional data, which limits its ability to establish and verify causal relationships. Second, the analysis of mediating effects could be expanded. For instance, future research could explore whether the rural collective economy enhances farmers' perception of equity by providing farmers with dividends and employment opportunities. Third, since the sample in this study is drawn from Zhejiang Province—where the rural collective economy is relatively well developed—the findings may not be fully generalizable to low-income regions or areas with less developed public services. Fourth, as the data are derived from collective economies in 44 villages in Zhejiang Province, the relatively small village-level sample size may limit the statistical validity of the analysis, even though cross-variable methods (rather than group regressions) were employed to examine the heterogeneous impacts of different collective economy models and scales on rural households' sense of spiritual gain. Future research could employ nationwide village-level datasets—such as the China Rural Revitalization Comprehensive Survey (CRRS)—to conduct more in-depth investigations.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving humans were approved by China Jiliang University College of Economics & Management. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

MZ: Software, Resources, Conceptualization, Investigation, Supervision, Writing – review & editing, Funding acquisition, Validation, Methodology, Writing – original draft. ZH: Conceptualization, Writing – review & editing, Funding acquisition, Writing – original draft, Methodology, Data curation, Formal analysis, Validation.

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Conflict of interest

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