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Factors influencing farmer entrepreneurs' decision to return home for sustainable rural development: evidence from China

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Introduction: Farmer entrepreneurs, as hybrid actors bridging urban capital and rural identity, play a vital role in promoting sustainable rural development by addressing rural hollowing and urban-rural disparities. Understanding the factors influencing their return migration decisions is therefore crucial.

Methods: This study investigates the multidimensional determinants shaping return intentions among farmer entrepreneurs using survey data from 1,573 individuals in Jintang County, China. The data were analyzed through ordered logistic regression, with robustness checks conducted via ordered probit models (AIC = 780, BIC = 845).

Results: (1) Economic Agency: Income level shows marginal significance ($\beta = 0.0035$, $p = 0.078$), with those earning over ¥100,000 annually being 1.8 times more likely to return (OR = 1.84), supporting Hypothesis H11. (2) Family Constraints: Childcare responsibilities significantly reduce return intentions ($\beta = -0.3167$, $p = 0.021$, OR = 0.728), while eldercare responsibilities show no significant effect ($\beta = 0.0796$, $p = 0.594$, OR = 1.083), possibly due to reliance on urban eldercare services. (3) Cultural Anchors: Frequent home visits ($\beta = 0.0314$, $p = 0.001$, OR = 1.032) and strong hometown identity ($\beta = 0.1578$, $p = 0.011$, OR = 1.171) jointly enhance return intentions. Monthly returnees are 3.2 times more likely to commit to resettlement than annual visitors. (4) Selective Policy Impact: General policy awareness does not influence return decisions ($\beta = -0.0099$, $p = 0.863$, OR = 0.990), while targeted expectations for local economic development ($\beta = 0.3914$, $p = 0.001$, OR = 1.479) and education improvements ($\beta = 0.3704$, $p = 0.033$, OR = 1.448) significantly encourage return.

Discussion: The findings underscore the importance of cultural identity, family dynamics, and targeted policy design in shaping the return decisions of farmer entrepreneurs. We recommend three policy directions: building cultural governance platforms to reinforce local identity, developing rural childcare cooperatives to reduce family constraints, and creating tailored policy communication strategies to improve engagement and responsiveness. These interventions can support SDG-aligned rural revitalization in post-migration contexts.

KEYWORDS

farmer entrepreneurs, return migration, sustainable rural development, cultural embeddedness, China

1 Introduction

In the shared challenges of global rural sustainable development, rural areas in developing countries generally face a triple dilemma: the “hollowing-out” of rural areas due to the continuous outflow of young labor, the widening economic gap caused by the imbalance in the allocation of production factors between urban and rural areas, and ecological degradation triggered by traditional extensive development models (Cajková and Cajka, 2021). As the largest developing country, China has carved out a unique path through “Rural Revitalization Strategy.” The “Rural Revitalization Strategy” is a series of policies aimed at promoting sustainable rural development, including industrial support, infrastructure investment, agricultural modernization, and social welfare improvements (hereafter referred to as policies promoting sustainable rural development). According to the Ministry of Agriculture and Rural Affairs, by 2024, over 15 million people had hometowns to start businesses, creating 3.4 million new jobs in rural areas. Among them, farmer to urban areas, accumulated entrepreneurial experience, and now reinvest in rural industries—played a crucial role, contributing 72% of the total investment in rural industries.

Farmer entrepreneurs refer to rural-origin individuals who have migrated to urban areas and established their own businesses, operating as self-employed migrants or business owners rather than wage workers. This group exhibits dual identities: on the one hand, they retain the rural roots and migration experience of migrant workers; on the other hand, they have accumulated economic capital, management experience, and business networks through urban entrepreneurship (Zhang et al., 2022; Wu and Yuan, 2023).

Farmer entrepreneurs play a crucial role in sustainable rural development by reintegrating urban-acquired capital and expertise into rural economies (Qing et al., 2020). Recognizing their potential, the Chinese government has introduced financial incentives, land-use policies, and rural entrepreneurship programs to facilitate their return. Scholars highlight that their dual embeddedness in urban and rural networks enables them to drive industrial upgrading, job creation, and sustainable resource use (Xu, 2011; Köhler et al., 2019; Li G. et al., 2019). The study focuses on this group because, compared to wage workers, they possess greater financial autonomy, entrepreneurial agency, and resource-mobilizing capacity, making them key actors in bridging urban capital with efforts to promote sustainable rural development.

Existing studies on the return migration decisions of rural migrant workers have largely been interpreted through the push-pull theory framework, emphasizing universal factors such as economic income and family responsibilities, yet overlooking the distinctiveness of the farmer entrepreneur group (Shahraki et al., 2020; Riethmuller et al., 2021). This distinctiveness manifests as:

- (1) Capital Heterogeneity. The average entrepreneurial capital amounts to 65,250 USD (from the China Ministry of Agriculture and Rural Affairs, 2023), with the capacity to drive industry development.
- (2) Decision-making Complexity. Requires multidimensional trade-offs between business opportunity recognition, social

network restructuring, and cultural identity reconstruction (Meijer et al., 2014).

- (3) Policy Sensitivity. Responsiveness to institutional innovations such as land reforms and tax incentives is significantly higher than that of general migrant workers (Barbier, 1987; Faria and Mixon, 2016).

Meanwhile, existing policy tools exhibit critical misalignment in incentivizing return migration: while generalized rural development programs fail to activate farmer entrepreneurs' homecoming intentions, entrepreneur-targeted measures often lack integration with sustainable rural development objectives (Lichter and Brown, 2011; Lange et al., 2013; Mohabir et al., 2017). Despite these challenges, the literature has not yet offered a comprehensive framework that captures the complex interplay between individual motivations, family constraints, cultural attachment, and policy incentives specific to farmer entrepreneurs. This dual gap—both conceptual and empirical—forms the foundation for our research objective.

Therefore, this study aims to develop a comprehensive analytical framework to systematically investigate the multidimensional factors influencing the return migration intentions of farmer entrepreneurs. Specifically, it examines how economic capacity, family responsibilities, cultural identity, and policy perceptions (particularly targeted policy expectations) interact to shape their willingness to return and contribute to sustainable rural development.

This paper is structured as follows. Section 2 reviews the literature, finds the research gap and develops the research hypotheses. Section 3 introduces the data and methodology. Section 4 presents the empirical results and discussion. Section 5 concludes with key findings, practical implications, and directions for future research.

2 Literature review and research hypothesis

2.1 Literature review

The return migration of farmer entrepreneurs is not merely a demographic movement but a strategic process that actively contributes to sustainable rural development. Unlike general return migrants, who may return for personal or retirement purposes, farmer entrepreneurs typically return with the intention to invest, establish businesses, and drive rural economic transformation (Karlan et al., 2014). Their return is closely linked to industrial revitalization, employment generation, and knowledge spillovers, making it an essential mechanism for fostering rural sustainability (Golabi and Ebrahimi, 2018). Existing research predominantly examines how farmer entrepreneurs enhance rural development after returning, yet their return itself is an integral part of the sustainability process. Government policies promoting sustainable rural development explicitly aim to attract and support their return, reinforcing the direct relationship between return migration and sustainable rural development (Qing et al., 2020). Therefore, this study conceptualizes willingness to return as a prerequisite for

engaging in sustainable rural development, rather than treating them as separate outcomes.

Existing research has extensively explored the various factors influencing farmers' decisions to participate in promoting sustainable rural development. However, more studies are needed on farmer entrepreneurs. Among the many factors affecting farmers' engagement in sustainable rural development, the combined effects of economic benefits and social policies are particularly prominent, while cultural identity and local attachment have also attracted attention from scholars.

Economic factors are widely recognized as critical influences on farmers' participation in policies promoting sustainable rural development, with the level of personal income being particularly significant (Mendelsohn et al., 1994; Zhao, 2002; Liu et al., 2018; Deng et al., 2023). Research shows that higher income levels enable farmers to have more capacity to invest in rural development projects (Mancinelli, 2020; Rathgeb, 2020; Amrith, 2021; Platts et al., 2023). An empirical analysis of rural areas in eastern China found that farmers with higher incomes tend to engage in sustainable agricultural practices and rural entrepreneurship (Bai and Chow, 2014; Xiao et al., 2022; Wu and Wu, 2023). Moreover, some studies suggest that farmers may invest in rural infrastructure and ecological improvements, making participation in policies promoting sustainable rural development more appealing once they have achieved a certain level of economic stability. While existing studies have explored how economic stability influences participation in community and development initiatives (Vlahov et al., 2007; Nolte and McKee, 2008; Jiang and Wen, 2020; Allam et al., 2022), fewer studies have specifically examined how income levels shape farmer entrepreneurs' return migration decisions and engagement in sustainable rural development. Building upon this broader understanding, the article hypothesizes that farmers with higher income levels have greater flexibility and willingness to contribute to rural sustainable development initiatives.

H₁₁. There is a significant positive relationship between the personal income level of farmer entrepreneurs and their willingness to return and participate in sustainable rural development.

Family responsibilities and social ties play a crucial role in farmers' decisions to engage in rural development (Wang et al., 2021). Numerous studies have shown that family structure, family members' needs, and social network support collectively create a complex context that influences the decision to participate in community development projects (Carroll et al., 2020; Shaw et al., 2020; Lehtisalo et al., 2021). Some studies have further explored the influence of social ties on rural engagement decisions, suggesting that farmers with stronger community and family ties are more likely to invest in local sustainable development (Thompson and Bertaux, 2020; Vayro et al., 2019; Kamis et al., 2021). These social ties provide individuals with essential collaborative networks and resource-sharing opportunities, influencing their commitment to rural transformation (Jacobson, 1986; Shortland et al., 2022). Meanwhile, it has been found that the sense of family responsibility is not only directly reflected in intergenerational

agricultural continuity but also includes consideration of the long-term development of rural communities, which are important factors influencing whether farmers choose to participate in policies promoting sustainable rural development (Niu et al., 2023).

H₂₁. Farmer entrepreneurs who bear stronger family responsibilities (e.g., childcare or eldercare) are less likely to return to their hometowns to participate in rural revitalization.

The sense of cultural belonging and local identity among rural entrepreneurs reflects not only their emotional connection to their place of birth but also influences their participation in cultural preservation and rural innovation (Shu et al., 2023; Yin and Zhou, 2023; Zhou et al., 2023; Chen and Barcus, 2024). Numerous studies have shown that a strong sense of local identity motivates individuals to actively participate in rural heritage conservation and ecological protection (Bhuyan et al., 2020; Chataway, 2019; Yin and Qian, 2020; Ren et al., 2021). For example, Wei C. and Wang C. et al., pointed out that farmers' strong sense of cultural belonging to their hometowns is a primary motivation driving them to invest in rural tourism and traditional craft revival (Wei et al., 2023). Tang S. and Hao P. et al., further analyzed the influence of cultural identity on the choice of rural development and found that community members who believed their hometowns could achieve sustainable development through cultural assets were more likely to participate in sustainable rural development (Tang et al., 2020). The correlation between cultural identity and farmers' willingness to engage in rural transformation has been widely validated.

H₃₁. A stronger cultural identity with one's hometown significantly increases farmer entrepreneurs' willingness to engage in rural revitalization efforts.

Therefore, policies introduced by local governments have a profound impact on farmers' decisions to engage in sustainable rural development (Hu et al., 2023; Srinivasan, 2023; Liu et al., 2023). Many studies have indicated that government policies promoting sustainable rural development and green development directly affect farmers' livelihood opportunities and environmental quality, and indirectly shape their participation in ecological protection initiatives (Yang and Fahad, 2022; Zhang et al., 2023). Huang W and Zhang C analyzed the changes in China's rural development policies and their impact on farmers' willingness to adopt sustainable agricultural practices (Fama and Jensen, 2021). The study found that with the improvement of rural infrastructure and eco-compensation mechanisms, an increasing number of farmers tend to participate in green entrepreneurship and environmental stewardship. Shi X explored how r policies promoting sustainable rural development influence farmers' production methods and community engagement (Shi, 2022). They pointed out that government policies on rural industrial integration and clean energy provision have significantly increased the viability of sustainable rural enterprises, causing farmers who initially preferred urban employment to reconsider rural development opportunities. In addition, a study by Li G and Fang Y et al. emphasized the importance of policy perceptions in

farmers' decisions to invest in rural industries and that farmers' perceptions of and high satisfaction with government support policies significantly influence their attitudes and decisions to participate in policies promoting sustainable rural development (Li Y. et al., 2019).

H₄₁. Farmer entrepreneurs who have positive expectations for local economic development policies are more likely to express a willingness to return and engage in sustainable rural development.

H₄₂. Farmer entrepreneurs who value educational progress as part of rural revitalization policy are more inclined to return and contribute to local development.

H₄₃. Compared to general awareness of rural revitalization policies, specific policy expectations (e.g., economic or educational improvements) have a stronger positive influence on return intentions.

In summary, although a considerable body of literature has explored the factors influencing farmers' participation in rural revitalization, these studies have primarily focused on general rural laborers or smallholder farmers, often overlooking farmer entrepreneurs as a distinct subgroup. This group differs significantly in terms of entrepreneurial capital, decision-making complexity, and policy sensitivity, which makes their motivations and constraints meaningfully different.

Moreover, existing research tends to examine these factors—such as income, family obligations, and cultural identity—in isolation, lacking an integrated framework to explain how they interact in influencing return intentions. This study focuses specifically on farmer entrepreneurs and constructs a multidimensional analytical model that simultaneously incorporates economic, familial, cultural, and policy dimensions. This integrated approach contributes to a more holistic understanding of return migration behavior in the context of sustainable rural development.

2.2 Conceptual framework and hypothesis mapping

Building on the hypotheses developed in the previous section, this study constructs a conceptual framework to illustrate the multidimensional factors influencing farmer entrepreneurs' willingness to return and participate in sustainable rural development (see Figure 1). The framework integrates four key domains—individual, family, cultural, and policy levels—and maps each set of hypotheses to its corresponding theoretical dimension.

Specifically, H₁₁ captures the role of income level as an individual economic factor; H₂₁ reflects the influence of family responsibilities, particularly childcare and eldercare; H₃₁ addresses the emotional and identity-based attachment to the hometown; and H₄₁–H₄₃ reflect policy-related expectations, including economic development support, educational improvement, and the stronger influence of specific over general policy awareness. Together, these hypotheses form an integrated analytical model to explain how

both objective conditions and subjective perceptions shape return migration intentions among farmer entrepreneurs.

3 Methodology

3.1 Study area and data sources

3.1.1 Study area

In recent years, driven by rapid economic development and accelerated urban-rural integration, Jintang County in Chengdu (location shown in Figure 2) has emerged as a significant case for studying policies promoting sustainable rural development. The county demonstrates notable characteristics in population mobility and structural changes, particularly through its successful attraction of migrant workers and entrepreneurs. Census data reveals a remarkable increase in non-local residents from 4.60% to 29.12% between the 5th and 7th national censuses (see Table 1). This transformation reflects the county's growing capacity to attract human capital during its sustainable development process, particularly through new economic zones like the Huaikou New Area. The development of these emerging urban hubs has positioned Jintang County as a magnet for cross-regional labor mobility and green investment. These non-local residents, while maintaining original household registrations, have become active participants in local ecological civilization construction and circular economy development.

Driven by economic growth and the process of urbanization, Jintang County has not only become a hub for migrant labor, but also a starting point for some out-of-town workers to begin their entrepreneurial ventures. These farmer entrepreneurs with non-local household registration have accumulated capital, technology, and social capital in Jintang County, forming a relatively complete entrepreneurial ecosystem. As these entrepreneurs achieve operational stability and expand their resource bases, many face strategic decisions between reinvesting in policies promoting sustainable rural development and continuing urban-based ventures. The mobility patterns and development choices of this population offer crucial insights for creating sustainable demographic models. These characteristics make Jintang County an exemplary research area for studying rural-urban synergy development.

3.1.2 Data sources

Jintang county's administrative structure reveals significant variations in sustainable development potential across townships (see Table 2). Population distribution data shows substantial disparities, with Zhao Town's resident population reaching 228,053—significantly higher than smaller townships like GuanCang Street (45,318) and SanXi Town (33,516). The proportion of non-local residents varies remarkably, with Qixian Street (66.50%) and Huaikou Street (33.27%) demonstrating high attraction capacity for external human capital, compared to more locally-concentrated areas like Baiguo Street (15.12%). These differences reflect varying success levels in implementing policies promoting sustainable

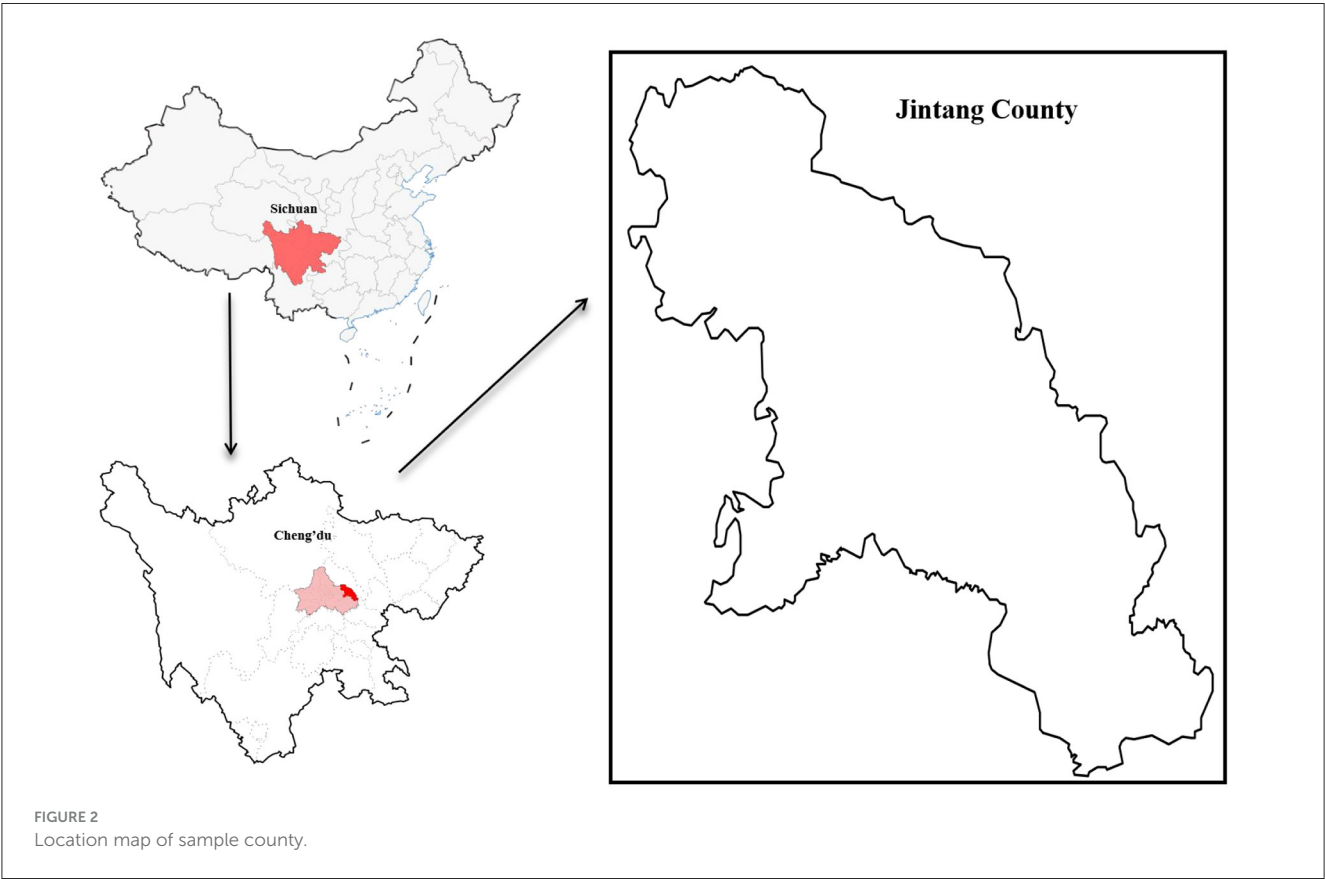
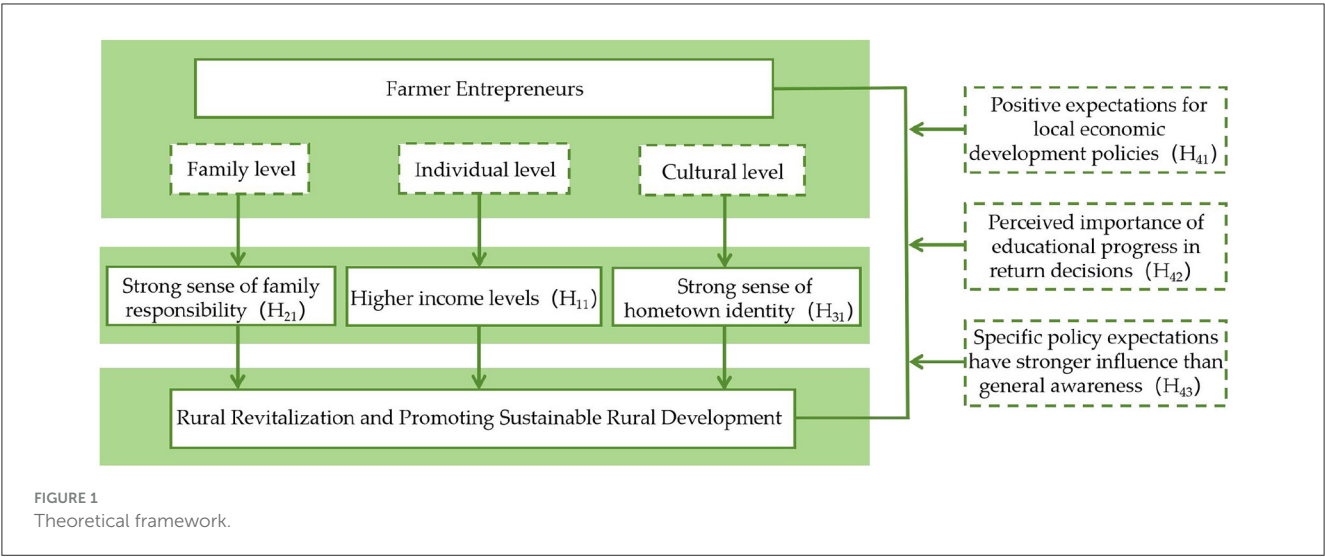


TABLE 1 Changes in the proportion of non-local household population across census periods.

Census	Resident population	Local household population	Non-local household population	Proportion of non-local household population
5th Census	772,273	736,768	35,505	4.60%
6th Census	717,227	664,049	53,178	7.41%
7th Census	800,371	567,287	233,084	29.12%

TABLE 2 Population distribution and proportion of non-local household population by township.

Census	Resident population	Local household population	Non-local household population	Proportion of non-local household population
Zhao Town	228,053	127,728	100,325	43.99%
GuanCang Street	39,911	36,279	3,632	9.10%
QiXian Street	106,242	35,591	70,651	66.50%
GaoBan Street	47,804	43,657	4,147	8.68%
BaiGuo Street	18,254	17,196	1,058	5.80%
HuaiKou Street	101,941	68,023	33,918	33.27%
WuFeng Town	16,441	14,913	1,528	9.29%
SanXi Town	23,040	21,767	1,273	5.53%
FuXing Town	29,089	26,268	2,821	9.70%
JinLong Town	16,069	15,061	1,008	6.27%
ZhaoJia Town	24,939	23,260	1,679	6.73%
ZhuGao Town	57,193	52,425	4,768	8.34%
ZhuanLong Town	36,083	34,296	1,787	4.95%
TuQiao Town	18,078	16,419	1,659	9.18%
YunHe Town	17,267	15,786	1,481	8.58%
YouXin Town	19,967	18,618	1,349	6.76%

Bold values indicate the townships selected for in-depth study due to their relatively high proportion of non-local household populations.

rural development and fostering environments conducive to entrepreneurship.

This study focuses on three townships in Jintang County with a relatively high proportion of non-local household populations: Zhao Town, Qixian Street, and Huaikou Street (geographical location shown in [Figure 3](#)). The proportion of non-local household populations in these areas is 43.99% in Zhao Town, 66.50% in Qixian Street, and 33.27% in Huaikou Street. These townships not only have a significant proportion of non-local households, but in recent years, they have also become key hubs for migrant workers, entrepreneurs, and investors. Zhao Town Street, as an important economic and commercial center in Jintang County, has attracted a large influx of labor from outside the area. Qixian Street and Huaikou Street, with their advantageous geographical location, infrastructure development, and industrial growth, have become important influx areas for non-local populations. As regions like Huaikou Street have developed, the proportion of non-local populations has significantly increased. These characteristics make these townships ideal for examining how farmer entrepreneurs contribute to sustainable rural development through cross-regional resource allocation and green technology adoption.

The data was collected through a structured questionnaire, focusing on various factors influencing participation in policies promoting sustainable rural development, such as the green economic capacity, intergenerational agricultural continuity, and cultural preservation commitments of farmer entrepreneurs. Communities in Zhao Town, Qixian Street, and Huaikou Street (rural areas) were selected as the study areas, using a convenience sampling strategy. Given

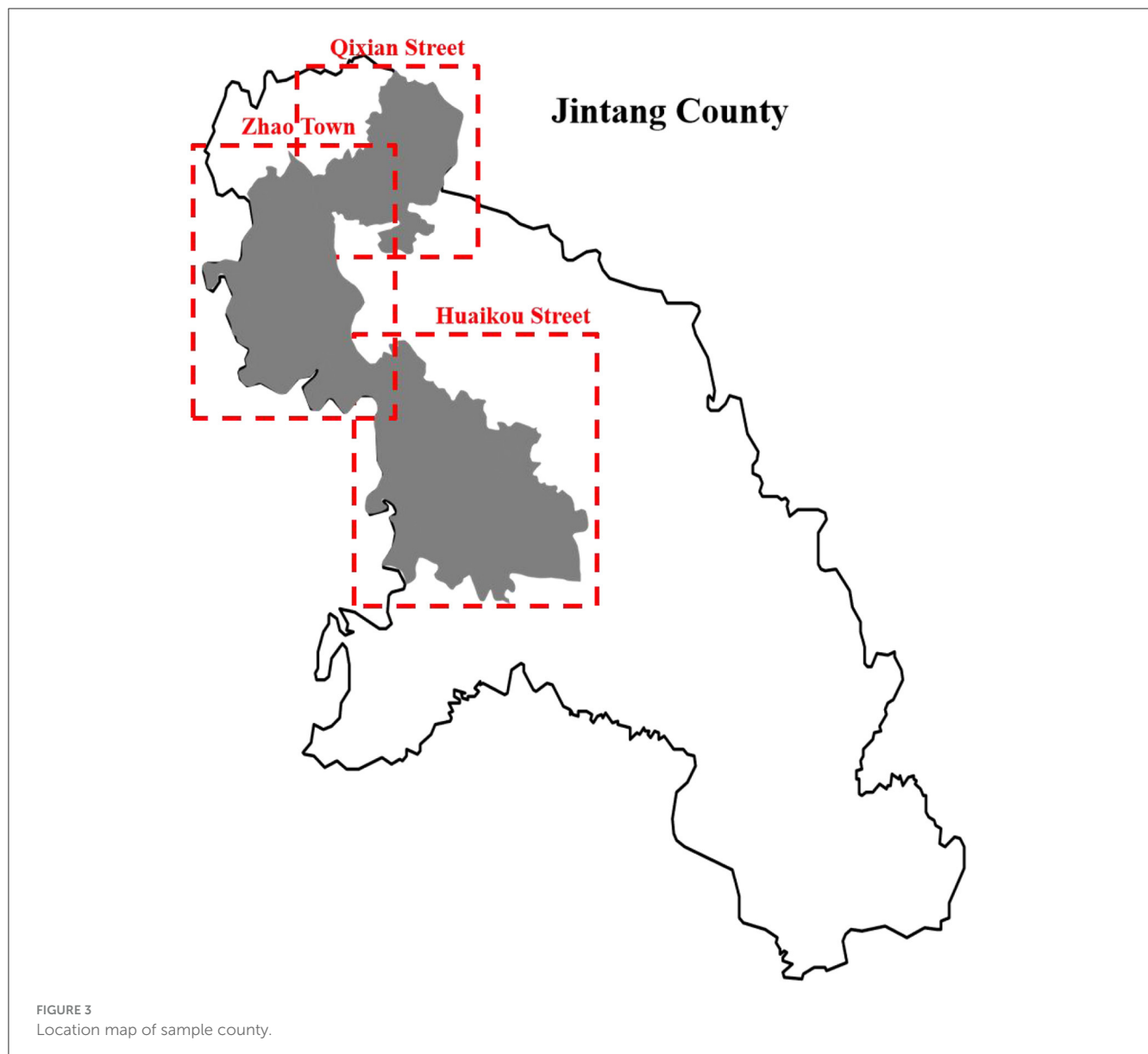
that the study population (farmer entrepreneurs) typically does not reside in their household registration area, the research team obtained contact information for potential respondents through cooperation with local communities. Based on the information provided by village officials, the research team selected 15 to 25 farmer entrepreneurs from each community to ensure a representative sample. After successful contact, the team distributed 2,000 questionnaires and ultimately collected 1,573 valid responses, with a response rate of 78.65%.

3.2 Indicator selection and coding type

3.2.1 Selection of indicators

The purpose of this study is to explore and analyze the factors influencing farmer entrepreneurs' engagement in rural development initiatives, with the dependent variable being their willingness to return and promote sustainable rural development. To achieve this goal, several critical variables were measured as described below (see [Table 3](#)).

We categorized the determinants of migrant farmer entrepreneurs' engagement in promoting sustainable rural development into four main groups: green economic capacity, intergenerational agricultural commitment, cultural capital preservation, and policy synergy perception [see authors' related studies ([Ballew et al., 2020](#); [Le et al., 2020](#); [Magagula and Tsvakirai, 2019](#); [Guriev and Papaioannou, 2022](#))]. Each category contains various operationalized variables measured through distinct indicators.



In the category of economic status, we chose two indicators, time away from home to start a business and level of annual income [see (Dingel and Neiman, 2020; Cooper and Stewart, 2020; Reichelt et al., 2020)], which reflect the financial accumulation of farmer entrepreneurs and their expectations of future economic security. In the second category, family responsibilities included state of residence, presence of minor children, and support for elderly relatives [see (Stokes and Patterson, 2020; Finch and Groves, 2022)], measuring the duties and burdens of family life for farmer entrepreneurs, in this study, family responsibilities refer to those in the place of destination, where children and elderly relatives reside with the entrepreneur. Cultural identity was measured by the frequency of returning home and identification with hometown identity [see (Zou et al., 2021; Zhou and Tang, 2021; Shen et al., 2023; Li et al., 2024)], revealing the emotional connection between entrepreneurial

farmer entrepreneurs and their reliance on traditional cultural values. Finally, the policy perception dimension assessed the extent to which the farmer entrepreneurs were aware of the hometown government's policies to support returnees and their expectations for the future development of their hometowns [see (Salum, 2023; Shu et al., 2023; Ma et al., 2024)]. These variables collectively determine their commitment to advancing sustainable rural transformation.

3.2.2 Types of coding

The choice of each coding method should be based on the characteristics of the variables and their role in the study. The choice of each coding method should be based on the characteristics of the variables and their roles in the study. Correct coding ensures that the statistical model effectively reveals how

TABLE 3 Definition of variables and descriptive statistics results.

Variable type	Observational variables	Definitions and measurements	Mean	SD ^b
Implicit Variable	Willingness (Y)	Willingness to return and promote rural development (1 = very unwilling; 2 = unwilling; 3 = average; 4 = more willing; 5 = very willing)	3.392	0.23
Economic Situation	Time (1.1)	Length of time away from home to start a business (0.5 = <1 year; 2 = 1–3 years; 5 = 4–6 years; 10 = more than seven years)	6.024	0.016
	Income (1.2)	How much annual income in RMB (5 = under 10 w; 20 = 10–30 w; 40 = 31–50 w; 75 = 50–100 w; 125 = over 100)	37.5	0.002
Family Responsibilities	Residence (2.1)	Current residence status (A = living alone; B = living with spouse; C = living with children; D = living with parents; E = other)		0.137
	Care (2.2)	Whether there are minor children in need of care (0 = no; 1 = yes)	0.718	0.149
	Maintenance (2.3)	Whether there is an older adult to support (0 = no; 1 = yes)	0.782	0.01
Cultural Identity	Frequency (3.1)	Frequency of return (0 = never; 1 = 1 time per year or less; 4 = 2–6 times per year; 12 = 1 time per month; 24 = 2 times per month or more often)	6.322	0.061
	Attribution (3.2)	Own hometown identity (1 = very weak; 2 = weak; 3 = average; 4 = strong; 5 = very strong)	3.605	0.057
Policy Perception	Policy (4.1)	Knowledge of home government policies to support returnees (1 = not at all; 2 = not very well; 3 = average; 4 = quite well; 5 = very well)	3.112	0.136
	Expectations (4.2)	Expectations for the future development of the hometown (A = Economic development, improving employment opportunities; B = Cultural prosperity, enriching recreational activities; C = Environmental protection, improving the quality of life; D = Harmony in the community, enhancing cohesion; E = Progress in education, fostering more talents)		0.109
Socio-demographic	Gender (5.1)	Gender of the respondent (0 = Female; 1 = Male)	0.62	0.486
	Age (5.2)	Age in years (continuous)	42.3	12.7
	Educational Attainment (5.3)	Highest education level (1 = Primary or below; 2 = Junior high; 3 = Senior high; 4 = College or above)	2.8	0.95

these variables affect the willingness of farmer entrepreneurs to return and promote sustainable rural development (Pargaonkar, 2023). These codes allow the regression model to appropriately handle the de-pendent variable while estimating the independent effect of each variable, controlling for other factors (Gregorich et al., 2021).

In this paper, the following coding approaches are used to handle different types of variables:

Ordered classification code (Agresti, 2002): handles “willingness,” “belonging” and “policy” variables that have a clear order (e.g., from very unwilling to very willing). This coding reflects the natural order of the options.

Continuous numerical code (Cash and Wright, 1998): handles the “time” and “income” variables, selecting or appropriately representing the center of the value range.

Probabilistic coding (Chang et al., 2010): For the variable “frequency,” the numerical code corresponding to the actual return of the farmer entrepreneurs, which is uniformly converted into the number of times he returns to his house each month.

Binary code (Roth, 2006): Used for the “care” and “support” variables, which have only two categories and are usually coded as 0 and 1 for “no” and “yes.”

One-hot code (nominal classification code; Muehlboeck and Tate, 2021): For the “residence” and “expectation” variables, since there is no natural order between their categories, a nominal classification code is used, with a unique identifier for each category (e.g., A, B, C, D, E).

3.3 Econometric modeling

This study uses an ordered logistic regression model to analyze the factors influencing the willingness to return and promote rural development. The general form of the model is as follows:

In this study, the dependent variable is “the willingness to return and promote rural development,” and there are five states: “very unwilling ($Y = 1$)”, “unwilling ($Y = 2$)”, “general ($Y = 3$)”, “willing ($Y = 4$)”, and “very willing ($Y = 5$)”, which are ordered multi-categorical variables. “general ($Y = 3$)”, “willing ($Y = 4$)”, “very willing ($Y = 5$)”, which is an ordered multi categorical variable. Therefore, the ordered Mult categorical logistic regression model was chosen to study the effect of the willingness of farmer entrepreneurs who return and promote sustainable rural development. The specific expression is:

$$\log \left(\frac{P(Y \leq j)}{1 - P(Y \leq j)} \right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + \beta_1 C_n \quad (1)$$

Among them. Y represents the ordered categorization results of the willingness to return and promote sustainable rural development, and $X_1, X_2, \dots, X_n$ is the independent variables affecting this willingness, including core independent variables, control variables, and regional dummy variables, C_n are Control variables (such as gender, age, education, etc.) and β_0 is the intercept term (random disturbance term), and $\beta_1, \beta_2, \dots, \beta_n$ is the corresponding regression coefficient.

4 Findings and discussion

4.1 Descriptive statistics

Based on survey data from 1,573 farmer entrepreneurs in Jintang County, China, Table 3 summarizes the descriptive statistics of key variables. The sample comprised 62% males (mean = 0.62, SD = 0.49), with an average age of 42.3 years (SD = 12.7). Educational attainment averaged 2.8 (SD = 0.95), corresponding to a range between junior high school (level 2) and senior high school (level 3). Economically, respondents had an average entrepreneurial duration of 6.0 years (SD = 0.0016) and an annual income of 370,500 CNY (categorized as “310,000 CNY–500,000 CNY” in the ordinal coding scheme). Regarding family responsibilities, 71.8% reported childcare obligations (mean = 0.718, SD = 0.149), while 78.2% supported elderly dependents (mean = 0.782, SD = 0.012). Cultural and policy dimensions revealed moderate-to-strong hometown attachment, with an average return frequency of 6.32 times per year (SD = 0.061) and a mean cultural identity score of 3.60 (SD = 0.057) on a 5-point scale (1 = “very weak” to 5 = “very strong”). Overall, the sample reflects farmer entrepreneurs with moderate economic capital, pronounced familial duties, and significant cultural embeddedness, providing a robust foundation for subsequent regression analysis.

4.2 Baseline regression

In this study, an ordered logistic regression model was used to analyze the factors affecting the willingness of farmer entrepreneurs who return and promote sustainable rural development. The model's results are presented in Table 4, which includes co-efficient estimates, *t*-statistics, *p*-values, and 95% confidence intervals for each variable.

The model has a constant term (const) estimate of 1.9553, a high *t*-statistic of 8.502, a *p*-value of 0, and a confidence interval of [1.503, 2.408]. This result indicates that the model has a high baseline response probability after controlling for all other variables. The significance of the constant term suggests a statistically significant difference in the baseline category when the model does not include any explanatory variables.

4.2.1 Factors of the economic situation

Time away from home-based entrepreneurship (1.1): its coefficient of -0.0305 is close to the traditional significance threshold ($p = 0.054$) and *t*-value of -1.935 . The confidence interval $[-0.062, 0]$ suggests that prolonged time away from home-based entrepreneurship may negatively affect the willingness to return and promote sustainable rural development. This finding is consistent with the study by Hayes (2020), who found that prolonged absence from home for farmer entrepreneurs may reduce their attachment to their hometowns and their willingness to return home (Hayes, 2020).

Annual income level (1.2): The coefficient is 0.0035. Although it does not reach statistical significance ($P = 0.078$), the positive coefficient implies that higher income may promote the decision to return and promote sustainable rural development. While

previous studies (Kroeker, 2020; Gallent et al., 2022; Li and Xu, 2023; Liu et al., 2023; Shi et al., 2023) have examined the link between income and return migration, they mainly focus on general returnees rather than farmer entrepreneurs. Moreover, they emphasize financial motivations but overlook how income interacts with social and policy factors in shaping return decisions, which this study addresses. This supports H_{11} .

4.2.2 Family and identity factors

Family responsibilities (2.2 and 2.3): farmer entrepreneurs with minor children (-0.3167 , $P = 0.021$) have a negative impact on returning to their hometowns. This may be because families with children are more inclined to take advantage of better educational and health resources in cities to provide their children a better learning and living environment. In addition, the relationship between the need to support the elderly and their physical location is significant. Generally, if the elderly have already settled in cities, they may prefer to continue living there to take better advantage of well-developed health and social service resources. This phenomenon may lead to a relative weakening of the willingness of farmer entrepreneurs to return and promote sustainable rural development, especially if they have assumed the responsibility of supporting the elderly in the city.

Frequency of returning home (3.1): The coefficient is 0.0314 with a significance level of 0.001, indicating that farmer entrepreneurs who frequently return to their hometowns are more inclined to return and promote sustainable rural development. This tendency may be due to their greater familiarity with the local environment and their deep attachment to the society and culture of their hometown (Rauhut and Esteves, 2020; van der Star and Hochstenbach, 2022). Frequent visits to their hometowns allow them to maintain close ties, strengthening their sense of belonging to their home communities and their identification with family responsibilities.

4.2.3 Policy factors

The coefficients of variables 4.2_A and 4.2_B are 0.3914 and 0.4946, respectively, and are statistically significant (*p*-values of 0.001 and <0.001 , respectively). This indicates that the policy understanding and positive expectations of farmer entrepreneurs can significantly increase their willingness to return and promote sustainable rural development.

Regarding policy-related factors, our results reveal a meaningful distinction between general policy awareness and specific policy expectations. Variable 4.1 (general policy awareness) shows a non-significant effect ($\beta = -0.0099$, $p = 0.863$), suggesting that merely being informed about policy initiatives does not influence return intentions. This supports H_{43} , indicating that generalized policy exposure alone is not sufficient.

In contrast, specific expectations such as economic development ($\beta = 0.3914$, $p = 0.001$) and education progress ($\beta = 0.3704$, $p = 0.033$) both exhibit statistically significant and positive effects on return willingness. These findings support H_{41} and H_{42} , and suggest that targeted, actionable policy incentives are more effective motivators than abstract or general policy narratives.

TABLE 4 Results of regression analysis.

Variable	Coefficient (Coeff)	Odds Ratio (OR)	t	P> t	[0.025, 0.975] (confidence interval)	
const	1.9553	0.970	8.502	0	1.503	2.408
1.1	−0.0305	1.0035	−1.935	0.054	−0.062	0
1.2	0.0035	0.728	1.77	0.078	0	0.007
2.2	−0.3167	1.083	−2.314	0.021	−0.586	−0.048
2.3	0.0796	1.032	0.534	0.594	−0.214	0.373
3.1	0.0314	1.171	3.296	0.001	0.013	0.05
3.2	0.1578	0.990	2.571	0.011	0.037	0.279
4.1	−0.0099	1.304	−0.173	0.863	−0.122	0.103
2.1_A	0.265	1.623	1.951	0.052	−0.002	0.532
2.1_B	0.4843	3.253	4.453	0	0.27	0.698
2.1_C	1.1799	1.270	8.245	0	0.898	1.461
2.1_D	0.2387	0.808	1.324	0.186	−0.116	0.593
2.1_E	−0.2127	1.479	−0.756	0.45	−0.766	0.341
4.2_A	0.3914	1.640	3.488	0.001	0.171	0.612
4.2_B	0.4946	1.280	4.128	0	0.259	0.73
4.2_C	0.2472	1.571	1.928	0.055	−0.005	0.499
4.2_D	0.4517	1.448	3.444	0.001	0.194	0.71
4.2_E	0.3704	0.970	2.135	0.033	0.029	0.711
5.1	−0.102	0.903	−1.24	0.214	−0.265	0.061
5.2	0.021	1.021	2.04	0.042	0.001	0.041
5.3	0.156	1.169	2.49	0.013	0.034	0.278

R-squared = 0.508, Adj. R-squared = 0.468.
F-statistic = 5.638, Prob (F-statistic) = 2.94e-09.
AIC = 780, BIC = 845.

4.2.4 Model validity and explanatory power

The R-squared value of the model is 0.508, and the adjusted R-squared value is 0.468, indicating that the explanatory variables adequately explain the variation in the willingness of farmer entrepreneurs to return and promote sustainable rural development. The F-statistic was 5.638, with a *p*-value close to zero (2.94e-09), indicating that the model is significant. In addition, the AIC value is 780, and the BIC is 845, indicating that the model has an excellent fit and reasonable complexity.

After controlling for gender, age, and education, the core findings on economic agency (H₁₁) and cultural anchors (H₃₁) remain robust. Notably, higher education levels significantly enhance return intentions (OR = 1.169, *p* = 0.013), suggesting that educated entrepreneurs may perceive rural revitalization as a long-term value proposition. While gender differences are not statistically significant (*p* = 0.214), the direction of the coefficient aligns with prior studies indicating women’s stronger emotional ties to rural communities.

4.3 Robustness tests

In the previous subsection, we used an ordered logit model to analyze the factors influencing the willingness of

farmer entrepreneurs to return and promote sustainable rural development. To check the model selection’s robustness, we re-estimated the same data using an ordered probit model (see Table 5 for the results). Except for the slight difference in the magnitude of some of the coefficients, the results of the alternative model are consistent with those of the original model in terms of trend, indicating that this study passes the robustness test.

The ordered probit model shows consistency in estimating most coefficients compared to the ordered logit model. For example, variable 3.1 (frequency of returning home) significantly and positively affects the willingness of farmer entrepreneurs to return and promote sustainable rural development in both models (*p* = 0.001 in the probit model), increasing our findings’ reliability.

In addition, the coefficients of 1.1 (time spent away from home to start a business) and 2.2 (whether there are minor children to take care of), although less significant in the probit model, are in the same direction as in the logit model, further supporting our conclusions.

In the probit model, the threshold parameters (e.g., 1/2, 2/3, 3/4, 4/5) indicate the switching points between different willingness categories. The 1/2 and 3/4 thresholds are significant at the *P* < 0.005 level, indicating that the model effectively discriminates between varying levels of willingness to return and promote sustainable rural development.

TABLE 5 Results of regression analysis.

Variable	Coefficient (Coeff)	z	$P > z $	[0.025, 0.975] (confidence interval)	
1.1	−0.0293	−1.904	0.057	−0.059	0.001
1.2	0.0034	1.773	0.076	0	0.007
2.2	−0.3267	−2.431	0.015	−0.59	−0.063
2.3	0.045	0.309	0.757	−0.24	0.33
3.1	0.0319	3.439	0.001	0.014	0.05
3.2	0.1595	2.681	0.007	0.043	0.276
4.1	−0.0108	−0.195	0.845	−0.12	0.098
2.1_B	0.2089	1.374	0.17	−0.089	0.507
2.1_C	0.9293	4.798	0	0.55	1.309
2.1_D	0.0122	0.053	0.958	−0.439	0.463
2.1_E	−0.4225	−1.26	0.208	−1.08	0.235
4.2_B	0.1224	0.809	0.419	−0.174	0.419
4.2_C	−0.1528	−0.951	0.342	−0.468	0.162
4.2_D	0.0792	0.465	0.642	−0.254	0.413
4.2_E	0.0045	0.021	0.984	−0.42	0.429
1/2	−1.0332	−3.028	0.002	−1.702	−0.364
2/3	0.085	0.816	0.414	−0.119	0.289
3/4	−0.3168	−3.373	0.001	−0.501	−0.133
4/5	−0.1392	−1.612	0.107	−0.309	0.03

5 Discussion

Based on survey data, the study explores ordered logistic regression modeling to explore the multidimensional factors affecting their willingness to return and promote sustainable rural development. Aligned with previous findings, the study moves further and discusses how income interacts with family responsibilities, cultural identity, and policy perceptions. Additionally, some variations were observed, particularly in how policy perceptions influence return decisions, which may be due to differences in regional policy implementation and economic conditions. These findings provide a deeper understanding of the complexities influencing farmer entrepreneurs' willingness to return and engage in sustainable rural development.

In terms of economic factors, this study verified that the level of personal income contributes positively to the willingness to return and promote rural development, which is in line with the traditional view that the degree of economic freedom significantly influences an individual's choice of retirement location (Rathgeb, 2020; Mancinelli, 2020; Amrith, 2021; Wu and Wu, 2023). However, the effect of time away from home business on the willingness to return in this study did not reach statistical significance, which is inconsistent with the results of some regional studies, probably due to the differences in regional economic development and the unequal development opportunities of farmers in the process of leaving home business.

Regarding family responsibilities, this study found that farmer entrepreneurs with minor children were less willing to return. A

robust social support system may have mitigated the effect of family responsibilities on the choice of retirement location (Shin et al., 2019; Hill et al., 2020; Zhang et al., 2020). This finding of the present study emphasizes that family responsibilities may be an essential factor limiting return home in areas with weak social support.

Although cultural identity increases the propensity to return and promote sustainable rural development, which is consistent with the findings of Anthias F (Anthias and Lazaridis, 2020), policy perceptions did not have a significant effect on the propensity to return in this study, which is contrary to the findings of Kuitto and Helmdag (2021). This discrepancy may be due to the China-specific social policy environment and the limitations of policy advocacy. A study by Chinese scholars Huang W. and Zhang Chao showed that although the changes in China's rural policy aimed to improve pension conditions, many farmers were not well informed about these policies due to insufficient publicity and implementation, which affected their decision to return to their hometowns in old age (Huang and Zhang, 2021). In addition, Shi also pointed out that the opacity and lack of implementation of rural development policies limit the effects of the policies, resulting in the impact of policy perceptions on the willingness to return for old age not reaching the expected effect (Shi, 2022).

This study comprehensively analyzes the determinants of farmer entrepreneurs' willingness to return and promote sustainable rural development. Unlike previous studies focusing on a single variable, this study examines the interactions of multidimensional factors such as economic conditions, family responsibilities, cultural identity, and political perceptions. By

constructing an ordered logistic regression model and strictly controlling for multiple potential confounding variables, this paper not only improves the internal validity of the results but also enhances their extrapolation. Additionally, the methodological contribution of this study is to provide a more comprehensive analytical framework for exploring the complexity of farmers' intentions to return and the factors influencing it.

6 Conclusion

6.1 Conclusion and policy implications

The study examines the return migration intentions of farmer entrepreneurs in China, a distinct group with significant financial resources and entrepreneurial experience, which gives them advantages over ordinary rural households (Skinner and Winterton, 2017; Bartlett et al., 2022). By analyzing survey data from 1,573 farmer entrepreneurs using ordered logistic regression, the study identifies key factors influencing their return decisions and contributions to sustainable rural development. The findings reveal:

- (1) Economic autonomy significantly influences return migration, with higher income levels enhancing individuals' agency, though the result ($p = 0.078$) is marginally above the conventional threshold for significance.
- (2) Family obligations act as constraints on return decisions, especially childcare responsibilities, which prioritize urban services over rural relocation.
- (3) Cultural identity and policy incentives synergistically affect return intentions, with strong local cultural ties enhancing the likelihood of return.

Based on these findings, the following policy implications are recommended to encourage the return of migrant farmer entrepreneurs and promote rural development:

- (1) Enhance policy communication efficiency. Local governments should complement existing financial incentives with outreach campaigns to improve policy accessibility for farmer entrepreneurs.
- (2) Socialize family obligations. Public investment in rural healthcare, education, and infrastructure could alleviate family-related constraints, encouraging migration back to rural areas.
- (3) Institutionalize cultural affinity programs. Establishing year-round cultural engagement mechanisms can leverage cultural identity to boost return intentions.

6.2 Experience dissemination and research limitations

The study underscores the critical role of context-specific policy interventions in facilitating return migration, as demonstrated by examples from China, India, and sub-Saharan Africa (Hoff et al., 2019; Parande, 2022). Targeted incentives such as infrastructure development, tax reductions, and skill enhancement programs

have proven effective in attracting returnees and fostering sustainable rural development. However, the findings are geographically limited to Jintang County, China, and do not account for potentially influential factors such as health status or individual value systems, which may further complicate decision-making processes. Future research should focus on longitudinal policy assessments, reintegration impact evaluations, and the adoption of advanced machine learning techniques to refine predictive frameworks.

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

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent from the [patients/participants OR patients/participants legal guardian/next of kin] was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

YF: Conceptualization, Funding acquisition, Methodology, Project administration, Writing – review & editing. ZC: Conceptualization, Investigation, Resources, Writing – original draft. SW: Investigation, Writing – original draft. YZ: Data curation, Investigation, Writing – original draft.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The author(s) declare that no Gen AI was used in the creation of this manuscript.

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