

Study on livelihood sustainability and rural revitalisation policy effects of poverty-eradicating households based on DID model analysis

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Abstracts: China has achieved a comprehensive victory in the battle against poverty. At present, China is accelerating the effective connection between consolidating the results of poverty eradication and rural revitalisation. Based on the SLA framework, this paper constructs a livelihood sustainability indicator system and evaluates it through the entropy weight method, takes Gannan Soviet District as the study area, and based on the two-period DID model, empirically examines the impact of the policy of consolidating and expanding the results of poverty alleviation and rural revitalisation on the sustainability of the livelihoods of the households that have been lifted out of poverty, using the two-period panel data in 2020 and 2022 of the 243 farming households. The findings show that the policy of consolidating and expanding the effective linkage between poverty eradication and rural revitalisation has a significant driving effect on the livelihood sustainability of farm households, increasing the level of livelihood sustainability of farm households by 11.3%, and the conclusion remains reliable after the robustness test. Heterogeneity analyses found that the policy contributed more to the livelihood sustainability level of poverty-eradicating households whose head had a high level of education. The policy has a more significant positive effect on the livelihood sustainability of labour-led and agriculture-led households out of poverty than part-time employment.

Keywords: Consolidating and expanding the results of poverty eradication; livelihood sustainability; DID modelling; policy effects; Gannan Soviet area

1. Introduction

The Party Central Committee and the General Secretary attach special importance to consolidating the results of poverty eradication, preventing the return of poverty and effectively implementing rural revitalisation policies. Poverty eradication and rural revitalisation are intrinsically consistent in terms of value orientation and goal achievement, and preventing the return of poverty is the direct aim of consolidating the results of poverty eradication and laying the foundation for comprehensive rural revitalization [1]. Currently, the focus of rural revitalisation in China is on promoting sustainable livelihoods for households that have been lifted out of poverty. There are three main international frameworks for analysing sustainable livelihoods: CARE, UNDP and SLA, which dynamically analyse the sustainability of farmers' livelihoods from a capacity perspective [2]. Originally developed by the UK Department for International Development (DFID), the Sustainable Livelihoods Approach Framework (SLAMF) provides a holistic approach to understanding the complexity of livelihoods, particularly for the poor. The framework is designed to help develop interventions to improve the sustainability of livelihoods. The value of the framework is that it takes a holistic view of the factors that contribute to livelihood sustainability. The SLA framework divides livelihood capital into five dimensions: natural, human, physical, financial and social. The study shows that organic farming and fair trade contribute to the resilience of farmers' livelihoods and that human capital has the greatest impact on livelihood sustainability [3]. After constructing and analysing the livelihood sustainability framework, financial, human and natural capital were found to be critical for sustainable livelihoods after poverty eradication.

2. Livelihood sustainability evaluation

2.1. Construction of Sustainable Livelihood Evaluation Indicator System

Under the guidance of the SLA sustainable livelihood analysis framework compiled by the UK Department for International Development (DFID), this paper constructs a sustainable livelihood evaluation index system for farmers based on the essential connotation of sustainable livelihoods and in combination with the actual situation of the Gannan Soviet Union, which is divided into five first-level indexes, namely, natural capital, physical capital, financial capital, human capital and social capital, and 13 second-level indexes such as arable land area and quality of arable land, and quantifies the indexes by assigning values, standardising and taking logarithms [4]. The indicators were quantified by assigning values, standardisation and taking logarithms, and the entropy weighting method was used to determine the weights of the indicators and calculate the comprehensive index of livelihood sustainability.

Table 1 Livelihood sustainability evaluation system and weight allocation

Tier 1 indicators	Secondary indicators	Definition of Indicators	Assignment and Calculation Formulas	weights
Natural capital	Cultivated land area	Actual cropland area	Standardised	0.103
	Cultivated land quality	Expressed in terms of relative quality	0 for very poor; 0.25 for poor; 0.5 for average; 0.75 for good; 1 for very good	0.007
Physical capital	Value of durable goods	Present value of household durables converted to RMB	0 for less than \$1000; 0.25 for \$1001-4000.	0.019
	Housing structure	Type of house construction	0.5 for \$4001-8000; 0.75 for \$8001-12000; 1 for more than \$12000	0.017
Financial capital	Annual household income	Sum of all incomes	0.25 for civil engineering structures; 0.5 for masonry structures; 0.75 for brick and wood structures; 1 for brick-concrete structures	0.017
	Government loan	Whether to take out a government loan	Wage income + farming income + government subsidies + other income	0.261
	Bank Loan	Whether to take out a bank loan	Yes is 1; No is 0	0.199
Human Capital	Family size	Age	Yes is 1; No is 0	0.013
	Labour Force	Academic qualifications	Below 16×0.5+between 18 and 60×1+above 60×0.5	0.026
	Literacy	Number of job training received	Illiterate×0+Primary school×0.25+Junior high school×0.5+High school×0.75+College and above×1	0.254
	Employment Training	Share of total labour force in total population	Standardised	0.014
Social Capital	Percentage of labour force	Number of people who can borrow money for financial support	Labour force (16-60 years old)/number of people in the household	0.057
	Social Network	Subjective evaluation by respondents	Standardised	0.012
	Neighbourhood			

2.2. Description of Methods and Data

2.2.1 Evaluation method

This paper adopts the entropy weight method to calculate the composite index of the level of sustainability of farmers' livelihoods. Entropy weight method is an objective assignment method, and its core idea is that the greater the degree of dispersion of a certain index, i.e., the smaller the value of its information entropy, then the greater the influence (i.e., weight) of the index on the comprehensive evaluation. Therefore, the entropy weight method avoids the errors that may be brought by the subjective assignment method, and has high credibility and accuracy [5]. The calculation steps are: first, data standardisation; second, calculation of indicator weights; third, calculation of entropy value; fourth, calculation of difference coefficient; and finally, determination of weights to calculate the comprehensive score.

2.2.2 Data description

This paper refers to the Gannan Soviet Area in a narrow sense, i.e., the core area of the former Central Soviet Area - Gannan area, including the 18 counties (cities and districts) under the prefecture-level Ganzhou City. The Gannan Soviet Region has achieved a decisive victory in the battle against poverty, with all 1,948,800 poor people lifted out of poverty and all 11 poor counties removed from the hat, making it a good sample for studying the sustainability of policies on the livelihoods of households that have been lifted out of poverty [6]. The research team travelled to Ganzhou in 2023 to conduct a one-week household survey, selecting Shicheng County and Ningdu County under the jurisdiction of Ganzhou City as the research area. A total of 292 questionnaires were distributed (148 in Shicheng County and 144 in Ningdu County), and 23 poverty-eradication households were selected from the two counties for in-depth interviews. After eliminating the questionnaires with incomplete information or untrue information content filled in, 243 valid questionnaires were obtained, with a validity rate of 83.22%, including 116 households lifted out of poverty and 127 general farming households. The questionnaires cover four parts: head of household and family situation, productive life and livelihood capital, training and policy satisfaction.

2.3. Analysis of evaluation results

Table 2 Livelihood levels of respondents by type of survey

Type	Natural Capital	Physical Capital	Financial capital	Human Capital	Social Capital	Livelihood Capital
Households out of poverty	0.0082698	0.0196453	0.1307713	0.0348086	0.0105005	0.2039955
General farming households	0.0079390	0.0243416	0.1401909	0.0341495	0.0132911	0.2199121
Lower education	0.0082541	0.0218112	0.1314051	0.0291874	0.0122024	0.2028602
Higher education	0.0078954	0.0224665	0.1381215	0.0411710	0.0116495	0.2212678
Worker	0.0073803	0.022656	0.1229517	0.0355774	0.0122481	0.2007888
Farming	0.0114124	0.0213304	0.1322295	0.0336595	0.0115529	0.2101847
Part-time	0.0080216	0.0216839	0.1338371	0.0353500	0.0104209	0.2093135

Based on the distribution of weights in Table 1, the composite indices of various types of capital as well as livelihood sustainability for each type of farm household were calculated as shown in Table 2. The data reflect the distribution of the average livelihood level of different types of farm households. The level of livelihood sustainability of poverty eradication households is lower than that of general farm households, mainly in physical capital, financial capital and social capital; this paper classifies

farm households whose highest education level of the head of household is junior high school or below as a group with lower education level, and those whose highest education level of the head of household is senior high school or above as a group with higher education level, and the level of livelihood sustainability of the group with lower education level is lower than that of the group with higher education level, mainly in terms of physical capital, financial capital, human capital and so on; the data reflect the distribution of different categories of farm households in terms of average livelihood level, financial capital, human capital and other aspects; based on the characteristics of the research area object, this paper will be farming income accounted for more than 60% of the total income of the farm households classified as agriculture-led, wage income accounted for more than 60% of the total income of the farm households classified as the dominant type, the wage income accounted for more than 60% of the total income of the wage income in the range of 30% - 60% and the farm income accounted for 30% - 60% of the farm households in the range of 30% - 60%. Farming households with a wage income share of 30-60 per cent and a farming income share of 30-60 per cent are classified as part-timers, and the sustainability of farming livelihoods is significantly higher than that of labour and part-timers.

3. Method selection and model construction

3.1 Model construction

In this paper, 116 households out of poverty were used as the experimental group, and the remaining 127 general farm households were used as the control group. The DID model was used to test the effect of policy implementation on the sustainability of the livelihoods of the poverty-stricken households [7]. Taking 2021 as the node of policy implementation, this paper selects the survey data in 2020 and 2022 for empirical analysis and constructs the DID model as follows:

$$Livelihood_{it} = \alpha_0 + \alpha_1 Policy_{it} + \alpha_2 X_{it} + \mu_i + \delta_i + \varepsilon_i \quad (1)$$

Where, $Livelihood_{it}$ is the explanatory variable, indicating the level of livelihood sustainability of farmer i in year t ; $Policy_{it}$ is the dummy variable of policy implementation in year t . If farmer i is a poverty-removing household, it is the experimental group, and $Policy_{it}$ takes the value of 1; otherwise, it is the control group, and $Policy_{it}$ takes the value of 0. The coefficient α_1 reflects the degree of impacts of the policy on the livelihood sustainability of farmer households [8]. The coefficient α_1 reflects the degree of influence of policy on the sustainability of farmers' livelihoods, and X_{it} is other control variables that may affect the level of sustainability of farmers' livelihoods. μ_i , δ_i , ε_i denote the time fixed effects, individual fixed effects, and random perturbation terms, respectively.

3.2 Variable Selection and Explanation

Explained variables. The explanatory variable in this paper is the level of sustainability of farmers' livelihood. By selecting five primary indicators such as natural capital, physical capital, and 13 secondary indicators such as arable land area, arable land quality, etc. to construct the livelihood sustainability indicator system, using entropy weighting method to determine the weight of each indicator, and calculating the composite index to measure the level of sustainability of the livelihood of farm households.

Core explanatory variables. The dummy variable of consolidating and expanding the results of poverty alleviation and rural revitalisation policy implementation (Policy) is the core explanatory variable, taking the value of 1 if the farmer is a poverty-eradicating household, and the value of 0 if he is a general farming household [9].

Control variables. In this paper, household dependency ratio, non-farm business income and household gender ratio are selected as control variables. Household dependency ratio includes the proportion of non-labour force in the labour force, the higher the household dependency ratio, the

higher the burden and the easier it is to fall into poverty. Non-farm business income includes the sum of wage income, government subsidies and other incomes as a proportion of total income, reflecting the intensity of non-farm activities of farm households. Household sex ratio includes the ratio of male to female members in a household, reflecting the characteristics of the household structure [10].

4. Empirical results and analyses

4.1 Analysis of benchmark regression results

Table 3 demonstrates the regression results of the role of the policy of consolidating the results of poverty eradication on the sustainability of the livelihoods of the households that have escaped poverty in Gannan Su District. Column (1) presents the regression results when only the policy of consolidating the results of poverty eradication is used as the core explanatory variable, and column (2) presents the results of the analysis with the addition of control variables. It was found that the policy had a positive impact on the sustainable livelihoods of poverty-eradicating households with or without controlling for other variables, and the regression coefficients did not change significantly. Specifically, the policy of consolidating the results of poverty eradication was able to increase the level of sustainable livelihoods of poverty eradication households by 11.3 per cent, and the regression coefficients were all significant at the 1 per cent level. The articulation of policies further consolidates the results of poverty eradication and effectively guards the bottom line of returning to poverty on a large scale. With the implementation of the strategy of accelerating the modernisation of agriculture and rural areas, the continuous expansion of inputs in the three rural areas and the promotion of reforms in key areas and key links in rural areas, the vitality of rural development has been fully stimulated, the protection of rural development has become more powerful, and the farmers' sense of obtainment, well-being and security has been significantly improved.

Table 3 Benchmark regression results

	(1)	(2)
Consolidation of poverty eradication policies	0.114***(0.023)	0.113***(0.023)
Non-farm business income		0.121(0.098)
Household dependency ratio		-0.032(0.065)
Household gender ratio		0.005(0.030)
Year fixed effects	YES	YES
Individual fixed effects	YES	YES
Constant term	0.175***	0.091
Sample size	486.000	486.000
R ²	0.208	0.214

4.2 Robustness test

Replacement of explanatory variables. In this paper, the explanatory variables are replaced with the logarithm of the total annual income of farm households to examine the impact of the policy of consolidating the results of poverty eradication and poverty alleviation on the annual income of farm households, and to further verify the robustness of the policy of consolidating the results of poverty eradication and poverty alleviation on the sustainability of the livelihoods of farm households. The results obtained are shown in column (1) of Table 4, which shows that the coefficient of the policy of consolidating poverty eradication and poverty alleviation results is significantly positive, indicating that the policy of consolidating poverty eradication and poverty alleviation results significantly

contributes to the sustainable growth of the annual income of farm households, which proves the reliability of the conclusions of this paper.

Variable shrinkage processing. In this paper, the data of all variables are subjected to 1% shrinking treatment. As shown in column (2) of Table 4, the regression coefficients of the policy of consolidating the results of poverty alleviation and poverty alleviation have not changed significantly and are still significantly positive, which indicates that the policy's significant contribution to livelihood sustainability is somewhat robust.

Table 4 Robustness test results

	Substitution of explanatory variables (1)	Variable indentation (2)
Consolidation of poverty eradication policies	0.344***(0.050)	0.114***(0.023)
Control Variables	YES	YES
Year fixed	YES	YES
Individual fixed	YES	YES
Constant term	10.692***	0.087
Sample size	486.000	486.000
R ²	0.371	0.217

4.3 Heterogeneity test

Heterogeneity analysis of livelihood types. The previous section has classified farm households into labour-led, agriculture-led and part-time types based on the income shares of different livelihood activities. Since this paper uses two-period panel data, the livelihood type of some farm households has shifted and is not analysed for that part of the farm households. The impacts of policy convergence on the different types of livelihoods of poverty-eradicating households differ because of the different allocation of resources to different industries. As shown in Table 5, the magnitude of the impact of the policy is as follows: agricultural type > labour type > part-time type. At present, the primary industry is still the main pillar industry in Gannan, so the impact of rural revitalisation policy on the primary industry is also relatively large, and it is easier to act on the agriculture-type households out of poverty. The rural revitalisation policy is still in the early stage of policy implementation, and the impact on other industries is also relatively small. In the future, to improve the overall sustainable livelihood level of poverty-stricken households in the Gannan Soviet area, it is necessary to support the secondary and tertiary industries more vigorously, and optimise the overall industrial structure of the region.

Analysis of the heterogeneity of the education level of household heads. Education is an important factor affecting the policy convergence effect, and households with different levels of education may have greater differences in their knowledge of the policy, and thus be affected by the policy to a different extent. In this paper, households out of poverty are divided into 2 groups based on the highest level of education received by the head of household. It was found that sustainable livelihoods were positively affected by the policy effect in both groups, and that the higher education group was 1.9 per cent more affected by the policy than the lower education group. This may be due to the fact that the better educated group has a higher level of cognition and is able to better understand the policy opportunities and respond positively to the policy requirements in order to improve their sustainable livelihoods. The group with lower education level has limited understanding of the policy and because

of its relatively low cognitive level, the path of the policy is constrained, so the level of influence by the policy is also relatively low.

Table 5 Heterogeneity analysis regression results

	Lower education level (1)	Higher education level (2)	Labourer (3)	Farming (4)	Part-time (5)
Consolidation of poverty eradication policies	0.106***(0.032)	0.125***(0.036)	0.114***(0.030)	0.226***(0.061)	0.003(0.089)
Control Variables	YES	YES	YES	YES	YES
Year fixed	YES	YES	YES	YES	YES
Individual fixed	YES	YES	YES	YES	YES
Constant term	0.133	-0.024	0.011	0.076	0.105
Sample size	272.000	214.000	292.000	74.000	70.000
R ²	0.239	0.205	0.191	0.505	0.082

5. Conclusions and policy recommendations

This paper provides compelling evidence that targeted policies can have a positive impact on the livelihood sustainability of households moving out of poverty, particularly in the Gannan State Siouxland. By utilising the Sustainable Livelihood Approach (SLA) framework and entropy weights methodology, as well as a two-stage DID model, the study demonstrates how previous gains from poverty eradication and rural revitalisation efforts can be significantly improved. Key Findings: policy impact on livelihood sustainability Policies aimed at consolidating the gains from poverty eradication significantly improved the sustainability of farm households' livelihoods by 11.3%. This improvement is significantly consistent across various robustness tests, highlighting the effectiveness of these interventions. The impact of education level is observed to be significantly different depending on the education level of the household head. Household heads with higher levels of education experienced greater improvements in livelihood sustainability, suggesting that educational attainment is a key factor in leveraging policy benefits. The impacts on different types of households are more pronounced for households that are primarily engaged in labour and agriculture than for those engaged in part-time work. This difference highlights the importance of policy design in meeting the specific needs and capabilities of various types of households.

In response to these findings, a number of policy recommendations are made: strengthened policy implementation and linkages, the need for detailed Effective coordination of poverty eradication and rural revitalisation measures can significantly improve the sustainability of livelihoods. Investing in education and increasing investment in rural education can improve the overall quality of rural households. By improving education and investing in the development of a high-quality rural labour force, the employability and entrepreneurship of rural residents can be improved and sustainable income growth promoted. Tailor-made support measures, based on the types of livelihoods of poor households, can make assistance more effective by implementing categorised and precise assistance

for poor households. Targeted measures should be designed to address the specific needs of households to ensure that assistance has as much impact as possible.

While this study presents important findings, in-depth research on the mechanisms by which policies affect livelihood sustainability could enhance its practical relevance. Understanding the specific ways in which policy contributes to improved livelihood sustainability would provide valuable insights for policymakers and practitioners. Exploring these mechanisms in more detail could help refine current strategies and develop more nuanced interventions to meet the diverse needs of rural households, ensuring that policy measures are as effective and efficient as possible. This comprehensive analysis and the ensuing recommendations provide a solid foundation for improving the sustainability of livelihoods in rural areas. By focusing on the interlinkages between policy implementation, education and targeted support, a clear path can be found towards more resilient and sustainable rural communities.

Acknowledgements

National Innovation and Entrepreneurship Training Programme for Undergraduates of Jiangxi University of Finance and Economics, "Research on the Policy Effect of Consolidating the Achievements of Poverty Eradication and Rural Revitalisation - Based on the Survey on the Sustainability of Livelihoods of Poverty-Eliminating Households in the Gannan Soviet Area" (Project No. 202410421091)

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