

# THE POVERTY-BENEFIT EFFECTS OF THE INTEGRATION OF THREE RURAL SECTOR INDUSTRIES: THE CASE OF CHINA

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## ABSTRACT

This paper aims to empirically substantiate the poverty-benefit effects of the integration of the three rural sector industries in China. The study results show that the integration of three rural industries has a significant poverty-benefiting impact. The heterogeneity analysis shows that the age, gender, education level, and region of the household head also have a certain degree of influence on the poverty-benefit effect of the integration of the three rural industries. The study of the poverty-benefit impacts of the integration of the three rural industries can provide theoretical support for China to consolidate its poverty-eradication achievements, promote the integration of the three rural industries, and comprehensively promote rural revitalization and accelerate agricultural and rural modernization. At the same time, China's experience also has implications for developing rural industrial integration in other countries.

**Keywords:** Income Poverty, Multidimensional Poverty, Rural Integration of Three Industries, Poverty-Beneficial Effect, China

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## INTRODUCTION

Ever since 1978, China has been reforming the national economy, intending to significantly reduce poverty to comprehensively form a

“xiaokang” stratum in society (moderately prosperous society) (Qian & Yi, 2020). Using a multifaceted poverty elimination program mainly in rural areas (infrastructure development, retraining, subsidizing businesses

in rural areas, providing quality education to the poor, etc.), for over 40 years, about 800 million Chinese have moved out of poverty into the “xiaokang” social category. According to World Bank estimates, China has accounted for about 75% of the world’s poverty reduction over this period (World Bank Group, 2022).

China’s experience in eradicating extreme poverty demonstrates the sustainable development of the country’s rural regions. From the strategic height of China’s agricultural modernization, the integrated development of three rural industries has been emphasized and elevated to the national policy level. Promoting the integrated development of the three rural sector industries broadens the channels for farmers to increase their income, builds a modern agricultural industry system, accelerates the transformation of the agricultural development mode, and explores the road of agricultural modernization with Chinese characteristics.

In general, the poverty phenomenon in rural areas presents secondary-type poverty and relative poverty during a country’s economic and social transition (Li & Xu, 2018). Therefore, future efforts should be strengthening institutional guarantees, the effective promotion of integrated urban-rural development, establishing the main position of rural residents in the process of rural revitalization, and forming institutional innovations for poverty governance. Rural development and increasing the affluence of rural residents cannot rely solely on agricultural industries, but also on industrial integration to expand agricultural functions, extend industrial chains, cultivate new rural industries, new industries in general and new models, and inject new dynamic energy into rural development (Zhang, 2018). The integration of rural primary, secondary and tertiary industries can provide new growth points for high-quality rural development and is a way to continuously broaden the income of rural residents and improve their quality of life, and is also the main path for accelerating the transformation of the new development model of rural agriculture and the construction of a modern industrial system (Cao et al, 2019). Promoting the integration of three rural industries and realizing industrial prosperity is the goal orientation of rural industrial development and the basic premise of

promoting rural revitalization (Liu et al., 2022). Therefore, it is of theoretical and practical significance to study the poverty-benefiting effects of the integration of industries, which can be an essential focus point for studying rural governance and comprehensive rural revitalization and can also provide theoretical support for understanding the synergistic development of the integration of three industries and shared prosperity.

More studies have been done in the literature on the connotation, integration mode, integration level, income increasing the effect of rural residents, and the benefit linkage mechanism of the integration of the three rural industries (Xiao & Feng, 2020; Cao et al., 2019; Liu, Qiu & Fang, 2022). Compared with the existing relevant studies, the marginal contributions of this paper are mainly in the following aspects: First, the three industries’ integration index has been constructed and empirically tested, and the impact mechanism has been systematically explained. Second, considering the characteristics of multidimensional poverty of transition poor groups and potential poor groups, this paper compares the poverty level measured by multidimensional poverty criteria with the income poverty level, reflecting household poverty more comprehensively. Third and finally, this paper has empirically examined the poverty-beneficial effects of integrating three industries using the China Family Panel Studies (CFPS) data, providing empirical evidence for the government to further reforms to promote the integration of the three industries.

## LITERATURE REVIEW

### Practice of industrial convergence theory in rural areas

Agricultural industrialization is a series of business entities from supplying production materials to food processing and retailing. The industrialization of agriculture is an orderly chain composed of a series of operators, from the supply of production materials to food processing and retailing (Soegoto et al., 2022).

In Europe and the United States, the rural industrial integration mode is mainly reflected in integrating science and technology and rural tourism development. The United States has a well-developed agricultural industrialization system and a large scale of agricultural exports.

Integrating agriculture and e-commerce has formed world-leading agricultural e-commerce and developed agricultural science and technology and a higher degree of informatization and other agricultural core competitiveness. The United States has accumulated rich experience related to agricultural industrialization and is a global leader (Rickard & Sumner, 2008). France's rural industrial agricultural cooperation is mainly reflected in combining agricultural tourism. To a certain extent, rural tourism in France has promoted the integration of local agriculture into the secondary and tertiary industries and has played an essential role in extending the industrial chain, improving farmers' income, and promoting rural prosperity (Zhu, Huang & Cai, 2017). In the primary stage of promoting the integration of the three rural industries, the models of agricultural-business integration in the United States and agricultural-tourism integration in France have provided reference experience for the integrated development of rural industries in China (Jiang, 2021).

In Japan, promoting "Sixth Industrializations" essentially has been a process of promoting the integrated development of rural primary, secondary, and tertiary industries. One of the important achievements of Japan's "Sixth Industrializations" is the prosperity of the agricultural processing industry (Zhao & Liu, 2018). Korean scholars have also conducted much research on the integration of the three rural industries based on the "Sixth Industrializations" while taking into account the rural situation in Korea. They proposed providing part-time jobs for farmers in rural areas, to take the path of processing and manufacturing, to reprocess what is produced, to sell processed agricultural products to consumers and tourists, and to vertically integrate the development strategy of the "Sixth Industrializations" of agriculture (Kim et al., 2013). This has resulted in the revitalization of the Korean rural economy. In Japan and South Korea, the government has established a robust promotion mechanism to promote the development of the whole industrial chain in the countryside, with the secondary and tertiary industries as the primary focus. In addition, they have established a multi-faceted cooperation mechanism between industry, academia, and government to promote the development of the "Sixth Industrializations" in the countryside and realize the transformation

and upgrading of countryside industry (Zhao et al., 2021).

### **The development of the integration of the three rural sector industries in China**

With reference to existing studies, the integration mode of the three rural industries in China can be divided into an industrial restructuring type of integration, an industrial extension type of integration, an industrial crossover type of integration, and an industrial penetration type of integration (Yu, 2020). Zhang and Chen, D (2020) applied the analysis framework of "people-land-industry" and pointed out that to achieve the sustainable development of rural industrial integration, it is necessary to build an integrated "people-land-industry" mechanism with an information disclosure mechanism, an incentive compatibility mechanism, and a self-enhancement mechanism as the core. The synergetic mechanism is based on the information disclosure mechanism, incentive compatibility mechanism, and self-enhancement mechanism. Liu, Qiu and Fang (2022) constructed a theoretical framework from two dimensions of agricultural functionality and collaborative relationships and classified four categories of rural integration of three industries: traditional, professional, leisure and ideal.

#### **I. In terms of an integration effect.**

The integration of rural industries also leads to the development of industrial clusters, which significantly reduces the cost expenditures of farmers in information search, production decisions, and transportation. This can form a cluster effect, improve production efficiency, processing, and marketing, and maximize the income of farmers (Qi et al., 2021). The integrated development of rural industries has continuously cultivated several new business models, which has promoted the multifunctionality of agriculture and the transformation of agricultural development (Zhang & Chen, 2020).

#### **II. In the evaluation of the level of integration.**

Xiao and Feng (2020) matched traditional measurement indicators with the circulation, production, and distribution fields to measure the degree of rural industrial integration. Zhang

and Chen (2020) constructed an evaluation index system of rural industrial integration development from four dimensions: (1) extension of the agricultural industry chain; (2) multifunctionality of agriculture; (3) integration of the agricultural service industry; and (4) urban-rural integration. In addition, some scholars have studied the integration of three sector industries based on the framework of Sixth Industrialization Theory and Symbiosis Theory and have analyzed the mechanism of the integrated development of rural industries. Feng and Wang (2020) conducted a study on sixth industrialization theories regarding integration mode, driving force, integration effect, and value enhancement. They concluded that technology, data, and talent are the key elements affecting the development of industrial integration.

### III. In terms of promoting farmers' income.

The integration of rural primary, secondary and tertiary industries can increase farmers' income by affecting their property income, wage income, transfer income and household business income, and the level of education of the household head, the social capital of the household. Whether it is a new type of agricultural business subject or not, the level of economic infrastructure related to village industrial development and the area where it is located are the primary inducements for farmers' participation in the integration of the three industries. Participation in the integration of the three-sector industries has led to a significant increase in farm households' per capita operating income (Guo et al., 2019).

It can be seen from the above literature that great attention should be paid to the synergistic development of industrial development and the improvement of rural residents' income in rural revitalization. The development path and effective realization form of integrating the three industries, then, should be explored. Focusing on the role of resources, human capital, social capital, and learning mechanism, we strive to innovate an anti-poverty governance model and cultivate endogenous motivation for poverty eradication and feasible anti-poverty capacity.

## METHODOLOGY

### Sample data

This paper focuses on the integration of the

three rural industries in China using the linear regression models based on the data from the China Household Tracking Survey (CFPS) for 2016 and 2018 (the database only publishes data for even-numbered years) (CFPS, 2022). STATISTICA 12.0 software package was applied for modelling.

Based on the tracking-matched household sample, this paper first eliminated the missing and abnormal data. In addition, this paper also applied tail treatment to different continuous variables to change the extreme values that fall outside the 1% and 99% quartiles. A sample size of 4487 households per year was obtained.

### Econometric model

To study the benefit and poverty effect of the integration of the three rural industries, the core measurement model set in this paper is as follows (Chesneau et al., 2020):

$$y_{it} = \beta_{10} + \beta_{11} Mix_{it} + \beta_{12} X_{it} + \sigma_{it} \quad (1)$$

Among them,  $y_{it}$  represents the poverty indicators of a rural family  $i$  in year  $t$ , including the income poverty index, multidimensional poverty index, and poverty status under different poverty standards of rural family  $i$  in year  $t$ .  $Mix_{it}$  represents the three-sector industries integration index of the rural family  $i$  in year  $t$ .  $X_{it}$  controls the related factors that may affect the family poverty status  $i$  in year  $t$ . The family level includes the identity characteristics of the head of the household (gender, age, marital status, etc.), family size, social network level, and so on. At the regional level, the geographical location of rural households is divided into three regions: the eastern, central, and western regions.  $\sigma_{it}$  represents the random error term,  $\beta_{11}$ ,  $\beta_{12}$  - coefficients at independent variables, and  $\beta_{10}$  - a constant term.

### Variable selection

#### *Dependent variables*

Income poverty (*finpovn*) still plays a fundamental role, while in recent years, more and more scholars have shifted the perspective of poverty to multidimensional poverty (*MPI*), which more accurately describes the nature of poverty (Megits et al., 2020; Vasiljeva et al., 2020). This paper chooses to use income poverty criteria and multidimensional poverty criteria as dependent variables to construct models for

estimating the impact of the integration of the three rural sector industries on poverty in China.

The absolute poverty criterion (*finpovn*) selected in this paper was derived from the relevant definition of the national poverty line standard (Alkire & Foster, 2007). In terms of multidimensional poverty (*MPI*), we refer to Yang and Fu (2019) to set multidimensional poverty dimensions and indicators and combine the availability of CFPS data. In this paper, six

indicators from four dimensions of education level, health level, income level, and living condition were finally selected to measure multidimensional poverty (Table 1). The model and method of measuring multidimensional poverty set by Alkire-Foster were adopted (Alkire & Foster, 2007). The deprivation threshold aspect uses more stringent deprivation indicators and adopts an equal weight method for weight setting.

**Table 1:** Dimensions, indicators, deprivation thresholds, and weights of multidimensional poverty

Dimension	Indicator	Deprivation threshold value and assigned value	Value weightage
Education	Degree of Education	Family members with an education level less than junior high school are considered educational poverty and are assigned 1	1/4
Health	Self-reported health	If the self-rated health is “unhealthy”, it is considered health poverty and is assigned a value of 1	1/8
	Medical insurance	If any family members do not have any health insurance, it is considered health poverty and is assigned a value of 1	1/8
Income	Income	Per capita annual income below the poverty line of 2,300 yuan (2010 Price), are considered income poverty, and assigned a value of 1	1/4
The standard of living	Drinking water source	Household drinking water is a natural source of water (pond water, well water, etc.), and is assigned a value of 1	1/8
	The fuel of life	The cooking fuel is mainly non-clean energy such as firewood, which is assigned a value of 1	1/8

#### *Independent variables*

The index of integration of the three rural industries, personal characteristics, and household characteristics were used as independent variables. This paper constructed the index of the integration of the three-sector industries by combining CFPS data and utilizing

the entropy method to calculate (CFPS, 2022). The following indicators were selected to measure the integration of the three rural industries (the explanation of the specific indicators is shown in Table 2) (Xiao & Feng, 2020; Cao, Huang & Geng, 2019; Liu et al., 2022).

**Table 2:** Indicator system for measuring the degree of integration between the three rural industries

Index	Explanation	Property
Gross Output Value of Agricultural and Sideline Products (Yuan)	The structure of the rural industry is diversified, and the industry chain is extended lengthwise (gross output value of agriculture, forestry, animal husbandry, and fishery)	Positive indicator
Besides helping to do farm work and go out to work, whether there is wage income	Industrial chain extension brings farmers a gain (yes is assigned to 1, no is assigned to 0)	Positive indicators

Index	Explanation	Property
Land rent	It is conducive to the large-scale production of land and the development of characteristic agriculture, etc., to achieve agricultural versatility (the value of leasing is 1, otherwise it is 0)	Positive indicators
The total value of agricultural machinery (yuan)	Agricultural scale operation is closely related to mechanization; modernized production is an important symbol of the development of agricultural industrialization, which is conducive to the integration of rural industries.	Positive indicators
Engel coefficient	The proportion of household food expenditure in the total household expenditure; the decrease of Engel's coefficient is conducive to the interest linkage and the promotion of industrial integration.	Inverse indicator

Personal characteristics variables included age, gender (1 for males and 0 for females), and marital status (1 for married status and 0 for non-married status such as unmarried, cohabiting, divorced, and widowed) of the household head. Meanwhile, household characteristics variables were social network (communication costs and the proportion of income spent on favors), and household size was selected as control variables.

In addition, three dummy variables were introduced for the eastern, central, and western regions of China to control for regional differences in poverty (Ngoc Duc & Tin, 2022; Xiao & Feng, 2020; Cao, Huang & Geng, 2019). The list of the main variables in this study is given in Table 3.

**Table 3:** Descriptive of the main variables used to estimate the impact of the integration of the three rural sector industries on poverty in China

Variable	Variable Description
<i>Incpov</i>	Income poverty status (poverty is 1, otherwise 0)
<i>Multipov</i>	Multidimensional poverty status (poverty is 1, otherwise 0)
<i>Finpovn</i>	Inverse index of per capita net income represents the income poverty index
<i>Mpi</i>	Rural Family Multidimensional Poverty Composite Index, calculated on the basis of the indicators in Table 1
<i>Mix</i>	Rural household three-industry integration index, calculated on the basis of the indicators in Table 2
<i>Family Size</i>	Family size
<i>Age</i>	Head of household age
<i>Gender</i>	Head of household gender (male 1, female 0)
<i>Marriage</i>	Head of household Marital status (1 in marriage, 0 in other states)
<i>Socnet</i>	Social Network (based on CFPS Questionnaire - Favorite Spending)
<i>Party</i>	Party political status (if a member, 1, otherwise 0)

## RESULTS

The results of estimating the impact of the integration of the three rural sector industries on poverty in China are shown in Table 4. The results indicate that the impact of the rural household three-industry integration index on poverty in China is negative and significant at the 1% level

of significance when other factors are uncontrolled. It can be preliminarily suggested that the integration of three rural households increases household income. After controlling the information on household head characteristics and household characteristics, the results indicate that the impact of rural

household three-industry integration on poverty is still significantly negative.

**Table 4:** Characteristics of linear regression models for estimating the impact of integration of the three rural sector industries on poverty in China

Independent variable	Dependent variable			
	<i>finpovn</i>	<i>finpovn</i>	<i>MPI</i>	<i>MPI</i>
	(1)	(2)	(3)	(4)
<i>Mix</i>	-0.3407*** (0.0057)	-0.2941*** (0.0048)	-0.2169*** (0.0096)	-0.1778*** (0.0094)
<i>age</i>		0.0020*** (0.0002)		0.0019*** (0.0001)
<i>gender</i>		-0.0064*** (0.0043)		-0.0207*** (0.0035)
<i>marriage</i>		-0.0074*** (0.0066)		-0.0170*** (0.0049)
<i>party</i>		-0.0251*** (0.0082)		-0.0452*** (0.0067)
<i>socnet</i>		-0.3665** (0.0315)		-0.1367** (0.0207)
<i>family size</i>		0.0127*** (0.0011)		0.0006*** (0.0009)
<i>Eastern region</i>		0.1400* (0.0654)		0.0252** (0.0270)
<i>Central region</i>		0.1594* (0.0654)		0.0277** (0.0270)
<i>Western region</i>		0.1813* (0.0653)		0.0494** (0.0269)
<i>Constant term</i>	0.8579*** (0.0023)	0.5597* (0.0662)	0.3316*** (0.0021)	0.2299** (0.0282)
<i>N</i>	8924	8924	8924	8924
<i>Fem</i>	29.63	19.53	67.52	31.63
<i>Fcr</i>	3.84	1.94	3.84	1.94

Note: Figures in parentheses are robust standard errors, \*\*\*, \*\*, and \* indicate the level of significance at 1%, 5%, and 10%, respectively. *N* is the number of observations; *Fem* is an empirical value of the Fisher's test, *Fcr* is the critical value of the Fisher's test at a significance level of 5%

Male heads of household, marital status, party membership, and higher levels of social networks are less likely to make families poor. In addition, rural household three-industry integration has a more significant impact on income poverty than multidimensional poverty,

which may be because multidimensional poverty is more complex and difficult to alleviate.

The empirical values of the *F*-criterion exceed the critical values at a significance level of 5% for the constructed models, which indicates their adequacy (Chesneau et al., 2020).

The constructed regression models do not indicate the direction of the causal relationship between the integration variables of agricultural industries and poverty in China. Therefore, this paper introduces the three industries integration

indices with a time lag of 2 years (due to the publication of data every 2 years) to examine the impact on the current poverty level (Table 5).

**Table 5:** Characteristics of linear regression models for estimating the impact of the integration of the three rural sector industries on poverty in China (with a time lag)

Independent variable	Dependent variable			
	<i>finpovn</i>	<i>finpovn</i>	<i>MPI</i>	<i>MPI</i>
	(1)	(2)	(3)	(4)
<i>Mixlag</i>	-0.2097**	-0.1822**	-0.1686***	-0.1359***
	(0.0136)	(0.0134)	(0.0098)	(0.0095)
<i>Constant term</i>	-0.1380***	-0.2378**	0.3259***	0.2716***
	(0.0021)	(0.0112)	(0.0019)	(0.0092)
<i>Control variables</i>	No	Yes	No	Yes
<i>N</i>	7772	7772	7772	7772
<i>Fem</i>	38.52	16.93	58.19	34.11
<i>Fcr</i>	3.84	1.94	3.84	1.94

Note: Figures in parentheses are robust standard errors, \*\*\*, \*\*, and \* indicate level of significant at 1%, 5%, and 10%, respectively. The control variables in the table include age of household head, marital status marriage, political affiliation party, and household social network, *socnet*. *Mixlag* is the three industries integration index with a time lag of 2 years. *N* is the number of observations, *Fem* is the empirical value of the Fisher's test, and *Fcr* is the critical value of the Fisher's test at a significance level of 5%

The regression results introducing the lagged term show that the earlier findings still hold. The three industries integration index has a significant negative effect on households' poverty.

We also conducted group regressions to examine the impact on income poverty and multidimensional poverty according to varying characteristics of households: region; age of household head; gender of household head; and education level (Table 6).

The statistical significance of the models described in Table 6 is confirmed by:

- 1) the F-criterion, the empirical values of which exceed the critical ones;
- 2) the significance of the independent variables,

which is reflected through the level of significance (<10%);

- 3) the normal law of distribution of model residuals (Chesneau et al., 2020).



**Table 6:** Characteristics of linear regression models for estimating the impact of integration of the three rural sector industries on poverty in China depending on the grouping factors

Grouping factor	Finpovn (Income poverty)			MPI (Multidimensional poverty)			Control variables	Sample size
	<i>Mix</i>	<i>Constant term</i>	<i>Fem</i>	<i>Mix</i>	<i>Constant term</i>	<i>Fem</i>		
<i>Eastern region</i>	-0.3021***	-0.3314**	17.44	-0.1719***	0.2467**	25.36	Yes	2993
	(0.0038)	(0.0268)		(0.0051)	(0.0201)			
<i>Central region</i>	-0.2181***	-0.2768**	28.13	-0.1740***	0.2588**	45.27	Yes	2646
	(0.0060)	(0.0207)		(0.0070)	(0.0180)			
<i>Western region</i>	-0.2702***	-0.1874**	72.46	-0.1880***	0.2780**	33.71	Yes	3285
	(0.0020)	(0.0158)		(0.0072)	(0.0153)			
<i>Age&lt;54</i>	-0.2998***	-0.2164**	34.05	-0.1826***	0.3244***	28.52	Yes	4394
	(0.0005)	(0.0122)		(0.0024)	(0.0099)			
<i>Age&gt;54</i>	-0.2476***	-0.1096***	26.71	-0.2007***	0.4040***	30.62	Yes	4255
	(0.0098)	(0.0076)		(0.0054)	(0.0072)			
<i>Men</i>	-0.2799***	-0.2556**	22.44	-0.2003***	0.2768**	33.13	Yes	4990
	(0.0078)	(0.0157)		(0.0031)	(0.0134)			
<i>Women</i>	-0.2750***	-0.2342**	32.10	-0.1627***	0.2371**	28.33	Yes	3934
	(0.0024)	(0.0191)		(0.0035)	(0.0162)			
<i>Low level of education</i>	-0.2417***	-0.1774**	26.18	-0.1449***	0.3309**	30.05	Yes	3287
	(0.0064)	(0.0171)		(0.0057)	(0.0155)			
<i>Higher level of education</i>	-0.2800***	-0.2819**	30.14	-0.1745***	0.2547**	47.94	Yes	5637
	(0.0068)	(0.0156)		(0.0011)	(0.0127)			

Note: Figures in parentheses are robust standard errors, \*\*\*, \*\*, and \* indicate level of significant at 1%, 5%, and 10%, respectively. The control variables in the table include age of household head, marital status marriage, political affiliation party, and household social network, *socnet*. *N* is the number of observations, *Fem* is an empirical value of the Fisher's test, *Fcr* is the critical value of the Fisher's test at a significance level of 5%, which was 1.94.

## DISCUSSION

According to the estimated results of the subsample, no significant difference was found in the poverty-beneficial effect of the integration of the three rural industries on the eastern, central, and western regions. This suggests that integrating the three rural industries helps eliminate widespread poverty. In terms of income poverty, the three industries integration index coefficients in the eastern, central, and western regions were -0.3021, -0.2181, and -0.2702, respectively. This indicates that the poverty-benefiting effect on the east region is relatively more apparent, probably because the eastern part has a good location base, convenient

transportation, and good economic conditions, and has a better foundation for developing three rural industries integration. Thus, the poverty-benefiting effect of three rural industries' integration is more prominent. In terms of multidimensional poverty, the coefficients of the eastern, central, and western regions are -0.1719, -0.1740, and -0.1880, respectively, which indicates that the poverty benefit effect is more evident in the west region. The possible reasons for this result are twofold: First, it could be because the poverty level in the region of the west is more profound and the infrastructure and other aspects are more under-developed. Therefore, there is much room for improvement,

especially the improvement of water and fuel for living. Thus, the poverty benefit effect is better. Second, the geographical environment of the western region is unique, with many mountainous and hilly areas, which are suitable for injecting new momentum into rural development through leisure agriculture and tourism, thus, significantly raising the income level of rural residents and improving the overall environmental condition of the countryside.

The age of the household head affects the structure of household income and behavioral decision-making style to some extent. We conducted regressions using subsamples above and below the median age (54 years) to analyze the differences in the poverty-benefit effects of the integration of the three industries. Overall, no significant differences were found in the estimates. In terms of income poverty, the coefficients for the age <54 and age >54 groups were -0.2998 and -0.2476, respectively. This suggests that the poverty-benefit effect of the integration of the three industries is somewhat more profound for the age <54 group, probably because this group has a more remarkable ability to accept and adopt the technology of the integration of the three industries. Thus, the poverty-benefit effect of the integration of the three industries is relatively noticeable. In terms of multidimensional poverty, the coefficients of age <54 and age >54 are -0.1826 and -0.2007, respectively. The effect of integration of three industries on poverty is more evident for age >54 group, probably because this group is more likely to fall into multidimensional poverty. The change of production and living environment by the integration of three industries is more prominent, making the integration of three industries on poverty more significant.

In terms of income poverty, the coefficients are -0.2799 and -0.2750 for male and female heads of households, respectively. The coefficients are -0.2003 and -0.1627, respectively, for male and female heads of households in terms of multidimensional poverty. This shows that the household benefit poverty effect is more evident for male household heads under the same three integration indices, both in terms of income poverty and multidimensional poverty. This may be because they are more embedded in the triple integration and have higher skill levels. Thus, this household characteristic of male heads makes

the poverty-benefit effect of the three industry integration relatively prominent.

The level of education is an important factor affecting people's cognitive ability and decision-making level. We conducted regressions using subsamples above and below the median (1.949) to test whether there is a difference in the effect of higher or lower education levels on the poverty-benefiting impact of the integration of the three industries. The three rural sector industries are farming, manufacturing, and servicing industries. Regarding income poverty, the coefficients were -0.2417 and -0.2800 for the lower and higher education groups, respectively, and -0.1449 and -0.1745, respectively, for the lower and higher education groups in terms of multidimensional poverty. The poverty benefit effect is more evident for households with higher education levels. The higher the education level, the stronger the cognitive level, skill level, and self-development level, and thus the higher the poverty benefit effect. This indicates that special attention should be paid to the cultivation and enhancement of the human capital of rural households in the process of improving the overall development level of poverty-removing areas in the future.

## CONCLUSIONS

Based on the China Family Panel Studies (CFPS) data, we conducted an empirical analysis of the impact of three-industry rural integration on income poverty and multidimensional poverty. The study results show that the integration of three industries has a significant effect on income poverty and multidimensional poverty, i.e., the integration of the three-sector industries has a significant poverty-benefiting impact on rural households. This fundamental conclusion still holds after robustness tests and the mitigation of endogeneity bias. In addition, this paper verifies the moderating effect of the relationship between the integration of three industries with income poverty and multidimensional poverty. The beneficial effects of the integration of the three sectors on income poverty are more pronounced, which may be due to characteristics such as the complexity of multidimensional poverty, which makes it more difficult to alleviate and regulate. Further analysis reveals that the integration of the three rural industries contributes to eliminating widespread poverty. The differences in factors

such as the area where the household is located, the age and gender of the household head, and education level also have a certain degree of influence on the beneficial effect of the integration of the three industries on poverty.

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