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# Consolidating poverty alleviation and rural revitalization from the perspective of industrial assistance: China

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With the successful completion of the battle against poverty, the Chinese government now faces the critical challenge of further consolidating the outcomes of poverty alleviation while simultaneously advancing comprehensive rural revitalization. Ensuring an effective connection between poverty alleviation efforts and the rural revitalization strategy has become a key priority. Poverty alleviation focused on eliminating absolute poverty by providing targeted assistance, whereas rural revitalization seeks to promote comprehensive development through inclusive and sustained support. In contrast to the former's focus on specific households, rural revitalization not only considers welfare benefits but also emphasizes the importance of efficiency. In this context, industrial assistance emerges as a critical factor in bridging the gap between poverty alleviation and rural revitalization, as it significantly impacts both income growth and distribution. Thus, an important issue for policymakers is how to design effective industrial support policies that balance the need for raising income levels with the goal of reducing income disparities, addressing both efficiency and welfare concerns. Accordingly, this paper focuses on the scope of industrial assistance and examines the differential impacts of various industrial assistance targets on household income and income inequality among farmers, using panel survey data from Yunnan Province for empirical analysis. The research found that as the proportion of low human capital groups in industrial assistance targets decreases, farmers' income increases and income inequality among farmers increases, as opposed to providing industrial assistance only to low human capital groups. This may be because reducing assistance to groups with low human capital, while improving overall income growth, has led to a widening income gap between different groups, as more resources tend to be directed toward those with higher levels of human capital. For this research area, the empirical results show that if only households listed in the poverty registration system are considered as low human capital groups, it is more reasonable for low human capital groups to account for 50% of industrial assistance targets, at which ratio both welfare and efficiency objectives can be achieved. If marginal households are also considered as low human capital groups, this ratio can be further increased.

## KEYWORDS

industry assistance targets, low human capital, income, income inequality, China

## 1 Introduction

In 2020, China successfully eliminated absolute poverty, thus significantly contributing to global poverty reduction. However, a critical challenge that has emerged following the success of the poverty alleviation campaign is how to further consolidate these achievements. In this context, making an organic connection between poverty alleviation and rural revitalization strategies has become an important issue of concern in both academic and policy circles. Ensuring the long-term development and stability of previously impoverished areas through this connection is now a key focus for the government. Strategies to alleviate poverty concentrate on households listed under Poverty Registration schemes. Through the government's exceptional organization and mobilization of resources, a significant triumph of comprehensive poverty alleviation was achieved in a short timeframe, with a particular focus on targeted assistance (Liu et al., 2020; Liu et al., 2018). Comprehensive rural revitalization prioritizes inclusive and consistent support, with a focus on reducing the relative poverty that arises during development. This approach benefits more than a billion people in terms of policy and is characterized by its integrated and interconnected nature (Guo et al., 2019; Zhang et al., 2022). While addressing welfare concerns, rural revitalization also emphasizes the importance of efficiency. The goals of poverty alleviation and rural revitalization are different, and the relevant initiatives in the poverty alleviation stage cannot be copied exactly; therefore, policy transformation is required to achieve the goal of effectively connecting the two. As a result, policymakers face the critical challenge of designing effective measures that both raise income levels and reduce income disparities, while balancing efficiency and welfare considerations.

Industrial assistance plays a key role in linking poverty alleviation and rural revitalization, significantly affecting income growth and distribution. Directly, it raises beneficiaries' income through "blood transfusion" (e.g., transfer income) and "blood creation" (e.g., technology and resources). However, households with low human capital—such as those registered under the Poverty Registration schemes and marginal households—often lack the skills and motivation to fully utilize these resources, resulting in limited effectiveness of the assistance. As the proportion of these groups decreases, overall income growth may improve, but since wealthier groups benefit more, the income gap could widen. Indirectly, industrial assistance can benefit non-participants through technology diffusion and demonstration effects. Yet, low human capital groups lack endogenous growth momentum (Benabou and Tirole, 2006; Lucas, 1988) and have poor factor endowments, which limits their ability to benefit from spillover effects compared to groups with better endowments (Zhou, 2021). Thus, as the proportion of low human capital groups increases, the spillover effects and income growth slow, improving income disparity but reducing overall income growth. Therefore, improving industrial assistance policies to balance welfare and efficiency, while ensuring effective connection between poverty alleviation and rural revitalization, requires further research.

Industrial assistance is crucial for establishing an effective link between poverty alleviation and rural revitalization. A considerable number of studies have examined industrial aid with a primary emphasis on two aspects. The first is evaluating the impact of industrial assistance. For example, Guo et al. (2022) conducted a case study in Fuping County, Hebei Province and found that the structure

of the agricultural industry was altered, and farmers' income was augmented through industrial assistance. Similar conclusions were drawn in the studies conducted by Xu et al. (2022) and Tao et al. (2022). Liu et al. (2021) examined farmers' livelihood capital and concluded that industrial development has a substantial positive impact on their livelihood capital, particularly by enhancing their human, social, and financial capital. The second is about factors influencing the impact of industrial support. As Li (2017) observed, various types of industrial assistance have different effects. In the short term, the GSP model which converts poverty alleviation funds into cash and enables poor households to select their investment projects and preferred industries, is superior to the GTP model which provides capital such as piglets, chickens, and quality seeds to poor households and integrates their production directly into the local industrial system. However, in the medium and long term, the GTP is more effective in alleviating poverty. Additionally, the development of complementary industries is crucial. If the government's provision of public goods aimed at alleviating poverty in a disadvantaged region is not accompanied by fostering and growing the region's advantageous industries, the effectiveness of such support will be hindered (Chen and Cheng, 2017).

Many studies have examined the effectiveness of industrial assistance and the possible reasons for its minimal effectiveness, but only a few studies have focused on the impact of the scope of industrial assistance targets on the effectiveness of industrial assistance. Specifically, the dual impact mechanism of the participation proportion of low human capital groups on both income growth and income inequality has yet to be fully explored. Two scenarios exist for setting industrial assistance targets: (i) only for labor with low human capital and (ii) for groups intending to engage in industrial development. Human capital is critical to the effectiveness of industrial assistance (Deng et al., 2022). Vulnerable groups may have low levels of education, poor skills, and a low willingness to participate in industrial projects (Cheng et al., 2021). If the policy is overly biased toward vulnerable groups, the impact of industrial assistance may weaken because of the lack of human capital. However, if the government places too much emphasis on the role of human capital and fails to safeguard vulnerable human capital groups by setting quotas, it may lead to "elite capture," contrary to the goal of narrowing the income gap (Cheng and Wang, 2021). Therefore, various modes of industrial support established by the government may have different impacts, and how to set the scope of industrial assistance targets to achieve a balance between welfare and efficiency and to realize the dual goals of raising incomes and narrowing the income gap requires further research. Therefore, building on existing research, this paper incorporates the scope of industrial assistance beneficiaries into the analytical framework, using empirical research to explore the differential effects of varying participation proportions of low human capital groups in industrial assistance policies. This study not only enriches the literature in this field but also provides important policy implications for designing policies that balance efficiency and welfare. Additionally, while some scholars have highlighted the significance of directly-entering-socialism ethnic groups (DESEG) (Zhu and Bi, 2021), most have adopted qualitative analysis, and only a few studies have conducted empirical analysis based on research data. In this study, our tracking research in Yunnan directly covers DESEG groups, and the findings improve and complement related fields, which has important theoretical and policy implications.

In summary, this paper conducts an empirical analysis using panel data from 1,018 rural households across nine prefectures in Yunnan Province from 2017 to 2020, aiming to achieve the following research objectives: (1) to explore the performance differences among heterogeneous groups in industrial assistance and assess the impact of the proportion of low human capital groups on household income and income disparity; (2) to identify the balance point where the proportion of low human capital groups can reconcile both efficiency and equity; and (3) to provide practical guidance for optimizing industrial assistance policies to better promote industrial revitalization. This study not only enriches the existing literature on the scope of industrial assistance beneficiaries but also offers valuable insights for the effective integration of poverty alleviation and rural revitalization.

The remainder of this paper is structured as follows: The second section reviews the existing literature and constructs the theoretical analysis framework, focusing on the theoretical foundations and empirical studies related to the effectiveness of industrial assistance and the factors influencing it. Based on this, it explains the mechanisms through which the scope of industrial assistance beneficiaries affects policy outcomes. The third section introduces the research data and empirical analysis methods, detailing the data sources, variable definitions, and model selection. The fourth section presents the empirical results, showing the differential impact of varying proportions of weaker human capital groups in industrial assistance on household income and income disparity. It also identifies the optimal range of low human capital participation that balances welfare and efficiency objectives. The fifth section summarizes the findings, discusses the implications, and provides suggestions for future research and policy design.

## 2 Literature review and theoretical analysis framework

### 2.1 Literature review

Numerous studies have examined industrial assistance with a primary focus on assessing its impact and analyzing the factors that affect it.

First, existing studies have not reached a consistent conclusion regarding the impact of industrial assistance. Some scholars argue that industrial assistance has a substantial positive effect on farmers' livelihoods (Tao et al., 2022); however, this remains a topic of debate. Liu et al. (2021) used the propensity score matching method with double difference (PSM-DID) to estimate the impact of industrial poverty alleviation on farmers' livelihood capital and found that industrial poverty alleviation can significantly improve farmers' human, social, and financial capital. In the case of Fuping County in Hebei Province, Guo et al. (2022) found that the implementation of an industrial poverty alleviation policy promoted the diversification of rural industries and improved the farmer-market interface, thus increasing farmers' incomes. Xu et al. (2022) also found that industrial poverty alleviation policies effectively alleviated the vulnerability to poverty of poor households and reduced their future possibility of poverty. However, other researchers have presented different perspectives. For example, Wang et al. (2018) constructed an index system to measure the effectiveness of industrial assistance on three dimensions: economic status, living standards, and spiritual

dependence. Their findings revealed that industrial assistance did not have a significant effect on improving the living standards of poor rural households, and that its poverty alleviation effect was limited. Some scholars posit that achieving the desired effect of industrial poverty alleviation is difficult because of unclear beneficiary mechanisms, poor management of poverty alleviation funds, and high natural and market risks (Liu et al., 2018).

Second, industry type, complementary industries, and targeting are the main factors influencing the impact of industrial assistance. (i) Regarding industry type, the efficacy of various forms of industrial assistance differs. Li (2017) categorized China's industrial assistance models into two types: the GTP and the GSP. The GTP entails dispatching items such as piglets, chickens, and superior seeds to underprivileged households for integration into the local industrial system. The GSP involves disbursing poverty relief funds in cash to enable the poor to select an industry and invest independently. Li (2017) highlights that while the GSP performs better in the short term, it offers superior poverty alleviation in the medium to long term. Yang et al. (2022) states that the integration of agriculture with tourism, processing, planting, and breeding industries has the potential to substantially alleviate poverty. Nevertheless, integrating agriculture with the internet industry does not appear to yield significant benefits for those experiencing poverty. (ii) With regard to complementary industries, when the government supplies public goods to alleviate poverty in poor regions without cultivating and developing complementary industries, the efficacy of industrial support is affected (Chen and Cheng, 2017). (iii) Target ambiguity in the organizational sector poses significant obstacles to the poverty-alleviating effects of industrial growth (Yang and Lu, 2018). Furthermore, the resources provided by external organizations in support of the industry mainly benefits village officials and elites through village committees and cooperatives, including those engaged in large-scale cultivation.

In summary, previous research on the effects of industrial assistance has primarily focused on a single indicator, such as farm household income or livelihood capital, with less empirical research considering the dual objectives of increasing income and reducing income inequality. Additionally, research has emphasized the significance of targeting as a key factor affecting the effectiveness of industrial support. However, there has been limited quantitative analysis of the correlation between various industrial support targets and their impact on farm household income and the income disparity between such households. Moreover, the mechanisms underlying this relationship have not been extensively studied.

### 2.2 Theoretical framework for analysis

#### 2.2.1 Theoretical framework for analyzing the impact of different aid beneficiaries on farm income

Industrial assistance has direct and indirect effects on rural household income. First, it directly assists participating groups in increasing their income levels through external support and self-motivated efforts. These supportive measures and sustained self-motivation efforts are particularly important in impoverished rural areas, where wages and transfer income significantly contribute to the growth of agricultural household income (Zhang et al., 2020). Using Deqin County as an example, the research area of this study, revenue

projects anchored on assets were implemented in 2017. These projects involved 719 individuals who were considered relatively vulnerable and provided them with steady income growth. Moreover, providing technology and resources to enhance farmers' self-development capacity is vital for stimulating their intrinsic motivation for additional income growth. For example, in Deqin County, underprivileged individuals receive financial support, aid with projects, and technical assistance to improve their capacity to generate income.

However, the efficacy of industrial assistance depends on human capital characteristics including endogenous growth dynamics and potential development capacity. As the level of human capital decreases, industrial assistance efficiency also decreases. The endogenous growth dynamics of farmers play a vital role in income growth, and the absence of farmer autonomy can hinder the influence of industrial assistance (Xu et al., 2019). In certain remote regions, owing to historical and geographical factors, prolonged isolation has ensued, separating them from the rest of society at large and inclining the local population toward negative attitudes, such as the notion of "dependence." This mindset severely hampers their motivation and limits their capacity for self-improvement (Liu et al., 2017). Taking DESEG as an example, their transition from feudal serfdom and primitive society to a socialist society has resulted in a relatively low degree of social development. Consequently, these ethnic groups tend to be easily satisfied with their lives and exhibit high levels of happiness, while their endogenous motivation to increase their income is significantly lacking. Additionally, certain rural households may lack the developmental capacity necessary to fully reap the benefits of industrial assistance. This hinders the effectiveness of industrial assistance (Wang and Hu, 2019).

Positive outcomes from industrial development also generate indirect spillover impacts on groups not directly associated with industrial assistance programs, which consequently increase their income levels. The industrial assistance policy is a non-exclusionary public good. Thus, households not supported by industry can also benefit from the policy through market-oriented behavior, owing to their factor endowment, information, and social resource advantages (Zhou et al., 2023; Zhou, 2021). He (2022) noted that the significant income generated by some groups through industrial assistance provided other farmers with knowledge, technology, and opportunities to replicate production and industrial management techniques. This also stimulated the production enthusiasm and creativity of other farmers, leading to an increase in the momentum of indigenous growth. However, as the impact of industrial aid decreases, the incentive effect of industrial aid on groups not directly associated with industrial support ventures also diminishes, resulting in a decrease in the indirect income-generating effect of industrial support. Therefore, considering both direct and indirect effects, this study proposed the following hypothesis:

*Hypothesis 1:* Compared to not including vulnerable groups in the industrial assistance program, the level of income decreases as the proportion of vulnerable groups increases.

## 2.2.2 Theoretical framework for analyzing the impact of various beneficiaries on income distribution

The impact of industrial assistance on income inequality can be comprehensively analyzed in terms of both direct and indirect effects.

In terms of the direct impact, if the proportion of vulnerable groups is minimal, industrial aid will financially benefit relatively affluent groups, exacerbating the wealth gap. However, if the proportion of disadvantaged groups increases, the proportion of relatively poor individuals among direct beneficiaries also increases, resulting in a decrease in the wealth disparity between the more and less affluent.

Regarding the indirect effects, as the share of the low human capital group increases, the impact of industrial assistance decreases, and the spillover effect is further reduced because of insufficient human capital. The group with lower levels of human capital lacks sufficient endogenous growth momentum (Benabou and Tirole, 2006; Lucas, 1988) and has limited factor endowment, meaning that the group with a higher endowment of human capital is better equipped to benefit from the spillover effect of industrial support (Zhou, 2021). Therefore, as the proportion of low-skilled workers increases and the indirect benefits of industry support decreases, the capacity of the factor endowment group to produce income slows and the income gap widens.

Considering the interdependence of the direct and indirect effects of manufacturing support programs, this study presents the following hypotheses:

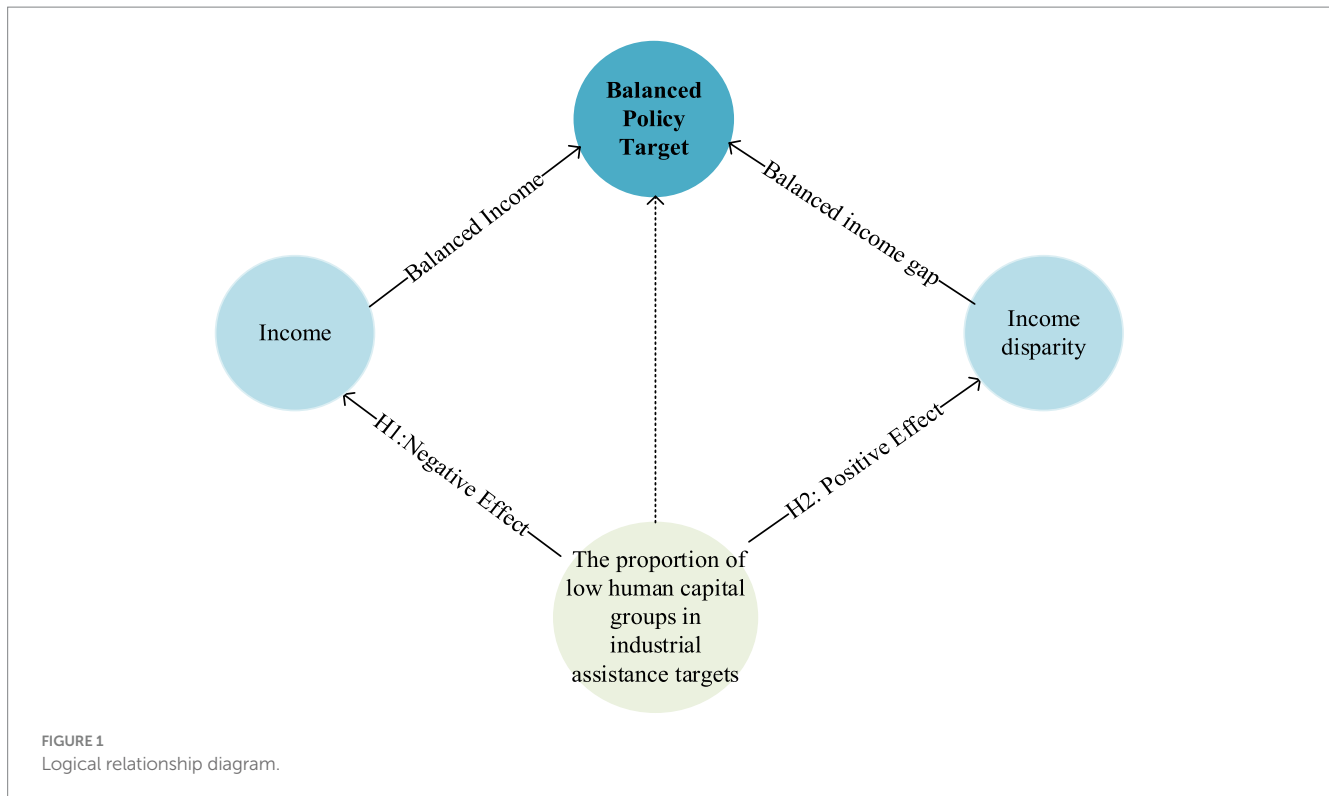
*Hypothesis 2:* Compared to not including vulnerable groups in the industrial assistance program, the level of income inequality decreases as the proportion of vulnerable groups increases.

Furthermore, the combination of Hypotheses 1 and 2 indicates that a smaller proportion of individuals with low human capital in an industrial aid project leads to a larger income gap impact. Conversely, a greater proportion of individuals with low human capital reduces the income gap and has a less substantial effect on income. Therefore, this study proposed expanding the scope of the industrial support program to include groups with high human capital while controlling the proportion to balance the objectives of increasing income and reducing income inequality (see Figure 1).

## 2.3 Data, variables, and model specifications

### 2.3.1 Data sources

The data used in this study derived from four rounds of continuous research on the implementation status of poverty alleviation in Yunnan Province conducted by a group from the Nanjing University of Posts and Telecommunications from 2017 to 2020. The research covered nine prefectures and 10 counties in Yunnan Province: Diqing Tibetan Autonomous Prefecture (Deqin County), Qujing City (Huize County), Pu'er City (Lancang County and Zhenyuan Yi, Hani and Lahu Autonomous County), Dehong Dai and Jingpo Autonomous Prefecture (Longchuan County), Dali Baizu Autonomous Prefecture (Nanjian Yi Autonomous County), Honghe Hani and Yi Autonomous Prefecture (Pingbian Miao Autonomous Prefecture), Wenshan Zhuang and Miao Autonomous Prefecture (Yanshan County), Lijiang City (Yongsheng County), and Zhaotong City (Zhenxiong County). These 10 counties are deeply poverty-stricken counties, minority autonomous counties, and ethnic concentration areas, with populations ranging from tens of thousands



(Deqin County) to millions (Zhenxiong County). Therefore, the research sample reflects the complex situation in Yunnan Province (see Figure 2).

In the field survey, the research team employed a stratified random sampling method to select two villages in each county based on their economic conditions, resulting in 20 sample villages. Subsequently, 45–55 farm households were randomly selected from each sample village, with the intention of interviewing 1,000 households annually. Household questionnaires were used to conduct follow-up surveys on farm households from 2017 to 2020. The acquired data provided considerable insight into the conditions faced by farm households in 2020. Given that some farm households moved or merged during the research process, only 740 farm households completed the four-year continuous follow-up survey, representing about 72% of the sample size in the initial year. The questionnaire pertained to household demographics, basic household information, land rights and industrial management, housing and living facilities, education and support, health and medical care, economic status, and satisfaction (Table 1).

### 2.3.2 Econometric model specifications

This study used a panel regression model (Jin et al., 2018; Liu and Cheng, 2022) and conducted a Hausman test to determine whether a panel fixed effects model or random effects model was appropriate (Bell and Jones, 2015). Aligned with the theoretical analysis framework, this study established income and income inequality indicators to investigate the varying effects of different industrial assistance levels on farm household income and income inequality. Equation 1 outlines the econometric model:

$$Target_i = C + \beta_1 \times Ratio_{it} + \alpha \times Control_{it} + v_i + \mu_{it} \quad (1)$$

where  $i$  indicates respondent  $i$ ;  $t$  represents the period;  $Target_i$  corresponds to the income or income fluidity indicator of respondent  $i$ ;  $Ratio_i$  is the core independent variable, indicating the percentage of poor households among those targeted for industrial poverty alleviation;  $Control_{it}$  represents other factors that affect the dependent variable over time, including individual and household characteristics;  $\alpha$  and  $\beta$  are the corresponding coefficients to be estimated; and  $v$  and  $\mu$  are the disturbance terms. In this context, the unobserved random  $v$  variable is the intercept term representing individual heterogeneity, while the disturbance term  $\mu$  varies across individuals and time. If the disturbance term  $v$  is correlated with any explanatory variable, the model is classified as a fixed effects model. However, if  $v$  is uncorrelated with all explanatory variables, the model is considered a random effects model. This study will further conduct tests based on the data to determine whether a random effects or fixed effects model should be employed.

### 2.3.3 Variable selection

First, this study combined existing relevant studies and research questionnaire questions to select the logarithm of annual per capita household disposable income and the income mobility index to measure income and income inequality, respectively (Fields and Ok, 1999; Zhou, 2021). To assess each participant's household income mobility status, we categorized households into 100 equitably sized groups based on income. Income fluidity was measured by calculating the difference in the group to which the household belonged from 1 year to the next. If the household income fell into a lower income group during the present period compared to the previous period, it was considered as flowing downwards and assigned a score of  $-1$ . If the income shifted to a higher-income group, it was assigned a score of  $1$ . A household was assigned a score of  $0$  if it remained in the same

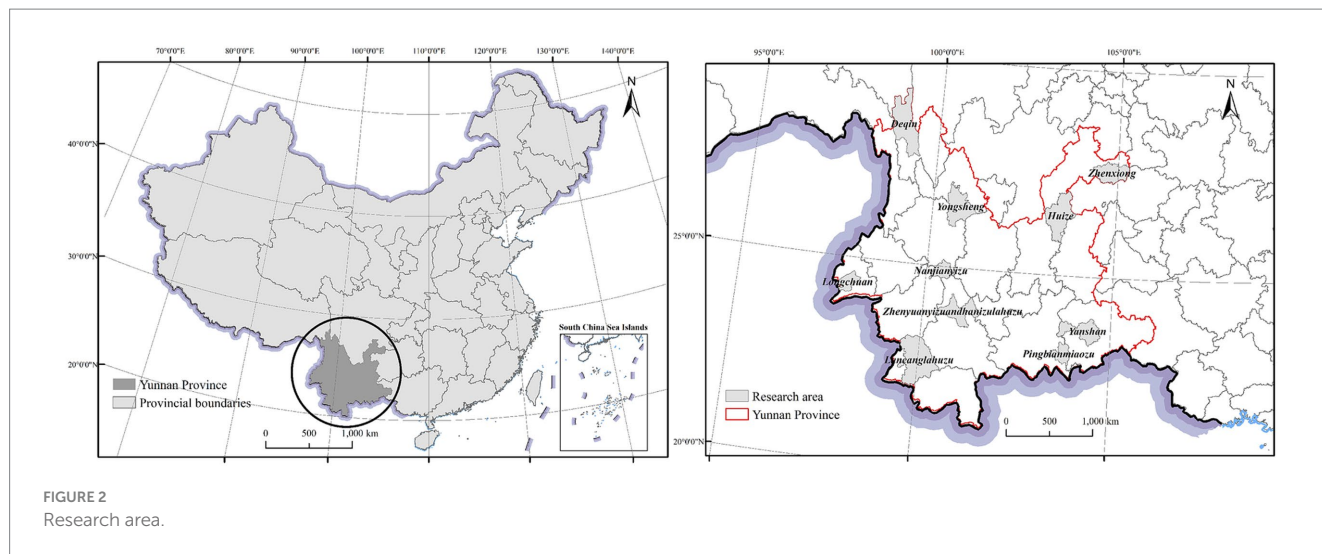


TABLE 1 Distribution of survey samples in each prefecture of Yunnan province over from 2017 to 2020.

District	2017	2018	2019	2020	Total
Lijiang city	97	100	107	107	411
Dali Baizu autonomous prefecture	100	100	100	100	400
Dehong Dai and Jingpo autonomous prefecture	100	100	100	100	400
Wenshan Zhuang and Miao autonomous prefecture	101	102	103	103	409
Zhaotong city	99	104	104	104	411
Pu'er city	199	201	204	199	803
Qujing city	100	99	100	99	398
Honghe Hani and Yi autonomous prefecture	100	100	104	99	403
Diqing Tibetan autonomous prefecture	100	100	107	107	414
Total	996	1,006	1,029	1,018	4,049

income group. Zhou (2021) proposed this method. For the vulnerable human capital group, an upward income trend implies a narrowing of the income gap between farm households. To conduct robustness analyses of the impact of industrial assistance recipients on income inequality, this study used the village Gini coefficient as an explanatory variable and controlled for village-level structural characteristics using village questionnaire information (Xiao et al., 2022; Xiao et al., 2023).

Second, the proportion of low-income households within the industrial target group in each village was used to indicate the percentage of vulnerable human capital groups in the industrial target group. Among those interviewed, some households were on the margins with incomes slightly above the poverty line; however, they were not regarded as meeting the poverty criteria. However, they face higher risk of returning to poverty if unfavorable shocks occur (Li et al., 2016; Si, 2020). Yunnan Province released relevant documentation in both 2019 and 2020, which clarified the standards for marginal households and explained their individual

circumstances<sup>1</sup>. Therefore, this study utilized various definitions for low human capital groups: (1) groups below the poverty line; (2) both households beneath poverty criteria and marginal households as low human capital groups. Two distinct techniques were implemented to analyze the differing effects of either including or excluding marginal households as low human capital groups, thereby establishing a basis for future policy development.

Similarly, with reference to existing studies (Liu et al., 2021; Zhou, 2021), we introduced relevant variables that affect income and income inequality, such as household, family, and village characteristics, as shown in Table 2. Given that this study's research area directly concerns

<sup>1</sup> See the Implementation Programme for the Dynamic Management of Poverty Alleviation Objects in Yunnan Province for 2019 and the Implementation Methodology for the Establishment of a Monitoring and Support Mechanism to Prevent the Return to Poverty.

TABLE 2 Descriptive statistics for variables.

Variable	Variable definition	Obs	Mean	Std. Dev.
Lnincome	Logarithm of per capita disposable income (CNY) (base period 2016, excluding CPI deflator)	2,960	8.88	1.33
Index <sub>mobility</sub>	Income fluidity index *	2,220	-0.02	0.99
Industry <sub>poverty</sub>	Percentage of households listed under the poverty registration scheme among those receiving industrial assistance in the village	2,960	0.11	0.22
Industry <sub>marginal</sub>	Percentage of vulnerable households (groups listed under the poverty registration scheme or slightly above the poverty line but at higher risk of falling back into poverty in case of adverse shocks) among those receiving industrial assistance in the village	1,480	0.13	0.16
HHethnic	Does the head of the household belong to an ethnic group that directly entered socialism? Yes = 1, 0 =	2,960	0.27	0.45
HHgender	Gender of household head: Male = 1, 0 = Female	2,960	0.90	0.31
HHedu	Educational attainment of head of household: no schooling = 1, primary school = 2; junior high school = 3; high school/secondary school = 4; university college = 5; university undergraduate degree = 6; postgraduate degree = 7	2,960	2.11	0.67
HHage	Age (year)	2,960	48.90	11.90
HHhealth	Health status of household head: healthy = 1, fair = 2, unhealthy = 3	2,960	1.36	0.71
Size	Total size of the household	2,960	4.25	1.58
Ratio <sub>labor</sub>	Ratio of the labor force to the total number of households	2,960	0.68	0.23
Lage	Average age of labor force (years)	2,960	37.56	6.59
Ledu	Average educational attainment of the labor force: no schooling = 1, primary school = 2; lower secondary school = 3; upper secondary school/secondary school = 4; university college = 5; university undergraduate degree = 6; postgraduate degree = 7	2,960	3.41	1.28
Lhealth	Average health status of the labor force: healthy = 1, fair = 2, unhealthy = 3	2,960	1.10	0.31
Lnmedical	Log of health care expenditures (CNY) (base period 2016, excluding CPI evaluation index)	2,960	3.62	5.83
Infrastructure	Satisfaction with the condition of roads to and from the village: very satisfied = 1, satisfied = 2, fair = 3, dissatisfied = 4, very dissatisfied = 5	2,960	1.61	0.93

① Since income mobility needs to be obtained by comparing the current period with the lagged period, the income mobility index of 2017 is missing. ② According to the Interim Measures of the State Council on Resettlement of Old, Weak, Sick, and Disabled Cadres, Interim Measures of the State Council on Retirement and Retirement of Workers, and the Law of the People's Republic of China on the Protection of Minors, this study restricted the age of the labor force to 16 years or above and below 60 years. ③ Since Yunnan province did not introduce the relevant policy details of marginal household standards in 2017 and 2018, the variable "the ratio of poor or marginal households with established cards among the targets of industrial assistance in the village" had only 1,490 samples.

DESEG, their distinctive ethnic cultures and traditions may affect income and income inequality (Mushinski and Pickering, 2000). Hence, this study incorporated the variable of whether the householder belongs to the DESEG. Specifically, this study considered Hani, Lisu, Lahu, Wa, Yao, Jingpo, Nu, De'ang, Jinuo, Brown, and Dulong ethnic minorities as DESEG, based on existing research by Lan (2019).

### 3 Empirical analysis results

#### 3.1 Regression results for the impact of industrial assistance targets on income

The results of Equation 1 are displayed in Table 3. The main independent variables, "Industry<sub>poverty</sub>" and "Industry<sub>marginal</sub>" have a

noteworthy adverse effect on the annual per capita disposable income of farm households. This indicates that as the proportion of vulnerable households among industrial assistance recipients in the surveyed village increases, the annual per capita disposable income of the surveyed households decreases. Thus, Hypothesis 1 was supported. The reduction in annual per capita disposable income among respondents' households may be attributed to the increase in low human capital among industrial assistance recipients, which weakens the direct and indirect effects of such assistance on augmenting income. Human capital, including the internal forces driving development and potential development capacity, is an important factor influencing the effects of industrial assistance (Wang and Hu, 2019). Owing to the relatively lower human capital of households listed in the poverty registration system, as the proportion of this group increases, the direct income generation effect of industrial

TABLE 3 Impact of different industrial help recipients on rural household welfare.

	Regression 1	Regression 2
	Group: poverty household	Group: poverty and marginal household
	Dependent variable: Lnincome	Dependent variable: Lnincome
Industry <sub>poverty</sub>	-0.791*** (0.157)	
Industry <sub>marginal</sub>		-1.497*** (0.405)
HHethic	-0.171 (0.309)	0.117 (0.613)
HHgender	0.228 (0.194)	0.317 (0.335)
HHedu	0.061 (0.061)	0.099 (0.117)
HHage	0.004 (0.006)	-0.001 (0.012)
HHhealth	-0.046 (0.059)	-0.027 (0.126)
Size	0.104** (0.044)	-0.014 (0.094)
Ratio <sub>labor</sub>	0.081 (0.281)	0.131 (0.601)
Lage	0.016* (0.009)	-0.003 (0.019)
Ledu	0.071 (0.044)	0.051 (0.082)
Lhealth	0.276** (0.133)	0.112 (0.269)
Lnmedical	-0.029*** (0.005)	-0.057*** (0.010)
Infrastructure	-0.162*** (0.031)	-0.139*** (0.051)
Constant	7.077*** (0.591)	8.636*** (1.231)
Observations	2,960	1,480
Cross-sectional observations	740	740
R <sup>2</sup> within	0.0469	0.0547
R <sup>2</sup> between	0.0023	0.0277
R <sup>2</sup> overall	0.0188	0.0360
Hausman test	Prob>chi <sup>2</sup> = 0.0000	Prob > chi <sup>2</sup> = 0.8914

Standard errors are reported in parentheses. \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

assistance is gradually reduced, and the indirect income generation effect brought about by the demonstration effect is further weakened. Wang and Hu (2019) found that low-income groups are marginalized by industrial support because of their limited education and skills, as well as their reluctance to take out loans. Consequently, these groups

can access only regular dividends from the village's collective economy, which negatively affects the effectiveness of industrial support.

From the estimation findings of the control variables, it is evident that "Lnmedical" and "Infrastructure" are significant factors impacting the respondents' annual per capita disposable income,



with relatively robust results. The coefficient of “Lnmedical” shows a significant negative correlation, which aligns with previous research (Huang, 2017), as healthcare expenses reflect medical risks faced by households, ultimately causing their income to decrease (Huang, 2017). The “Infrastructure” variable exhibits a marked inverse correlation. This implies that as satisfaction with the condition of village roads decreases, per capita disposable income also decreases. This finding aligns with the notion that rural regions characterized by increased investment in infrastructure may experience greater gains from industrial expansion (Zhou, 2021). The per capita annual disposable income is positively affected by “Lhealth,” as the health of poor households directly affects their ability to participate in labor production, which in turn affects the effectiveness of family participation in industrial support (Wang and Hu, 2019). The findings of this study do not reveal a conclusive correlation between farm household income and household size (or the age of the labor force). Regarding household size, there are two potential explanations. First, an increase in household size directly corresponds to an increase in the number of workers and thus a rise in total household income. Second, as household size increases, the population burden rate may also increase. Additionally, with regards to the age of the workforce, although experience may increase as the workforce ages (Taylor, 1975), there is also the potential for a decrease in the ability to acquire new knowledge (Mazzonna and Peracchi, 2012).

### 3.2 Regression results for the impact of industrial assistance targets on income distribution

To examine the impact of industrial assistance recipients on income inequality, this study drew from existing research (Zhou, 2021), focusing on the relatively poor group, taking income fluidity as the dependent variable, and conducting empirical analyses. The corresponding regression results are shown in Table 4. The estimation findings show that the coefficient of the proportion of low human capital groups among industrial assistance recipients is significantly positive. This result remains consistent and robust regardless of whether marginal households - those who recently emerged from poverty but are still economically vulnerable - are considered low human capital groups. This finding indicates that, as the proportion of vulnerable groups among industrial assistance recipients increases, the probability of upward income mobility for the relatively poor group increases, and the income gap tends to decrease significantly, which confirms Hypothesis 2. There are two possible reasons for this decrease in the income inequality gap. First, the direct effect: As the proportion of individuals with limited human capital in the targeted group of industrial assistance increases, so does the proportion of the relatively poor group in the group of direct beneficiaries, leading to an improvement in the gap between the rich and poor. Second, when indirect effects are considered, individuals with lower human capital exhibit insufficient internal drivers of development (Benabou and Tirole, 2006; Lucas, 1988) and possess comparatively inferior factor endowments compared to those with higher human capital. Thus, individuals with higher levels of human capital are more likely to benefit from the spillover effects of industrial assistance projects. Consequently, when the proportion

of the lower human capital groups increases, the indirect effects of industrial assistance decrease, the income-generating effects of individuals with higher human capital slow, and the income gap narrows.

The outcomes displayed in Table 4 demonstrate that “size” and “infrastructure” have a significant negative impact on income fluidity. A possible cause of increased income inequality could be the greater burden of the population caused by larger household sizes (Tang et al., 2021). Given that the scores increase as the respondents become less satisfied with road conditions, our results suggest that improved transport infrastructure reduces intra-rural income inequality, as expected. Moreover, Xiao et al. (2022) showed that rural infrastructure generally promotes higher income levels for rural Chinese residents, especially for low-income groups, implying that infrastructure also improves income distribution in rural areas.

The Gini coefficient is another significant metric used to evaluate income inequality (Jia et al., 2017). To provide a more comprehensive analysis of the findings, this study utilized previous research and selected village characteristic-related variables as control variables to examine the effects of industrial assistance recipients on intra-village income inequality (Xiao et al., 2022). The results in Table 5 show that an increase in the share of vulnerable human capital in the industrial assistance program reduces intra-village income inequality, for which the results are robust.

### 3.3 Selection of industrial assistance targets

The study’s findings demonstrate that an increase in the proportion of low human capital groups in the industrial assistance target leads to a reduction in farm household income, but an improvement in income inequality. Therefore, it is necessary to consider the appropriate proportion of groups with low human capital to achieve the dual objectives of simultaneously reducing income inequality and improving income. Considering the differences in the units and orders of magnitude between the income fluidity index and income indicators, it is necessary to first make the indicators dimensionless before the inclusive assessment so that they can be comprehensively analyzed (Yang et al., 2017). Dimensionlessness is similar to mathematical mapping, in which it is hoped that the mapping function will constrain the variables in the interval between 0 and 1 (Conejo, 2021). Linear dimensionless methods such as polarization and normalization preserve the correlation between variables (Yang et al., 2022). However, owing to the existence of negative income fluidity values, polarization is more suitable. Therefore, this study adopted polarization to address these variables.

$$X'_{ij} = \frac{x_{ij} - \min_{1 \leq i \leq m} x_{ij}}{\max_{1 \leq i \leq m} x_{ij} - \min_{1 \leq i \leq m} x_{ij}} \quad (2)$$

Using Stata 16.0 software, this study illustrated the correlations between the ratios of low human capital groups supported by industry, income, and income inequality. Our result shows that the two correlated lines intersect at approximately 0.5. As the difference

TABLE 4 Impact of different industrial help recipients on rural household income distribution.

	Regression 3	Regression 4
	Group: poverty household	Group: poverty and marginal household
	Dependent variable: Index <sub>mobility</sub>	Dependent variable: Index <sub>mobility</sub>
Industry <sub>poverty</sub>	0.860*** (0.251)	
Industry <sub>marginal</sub>		2.213*** (0.237)
HHethic	-0.301 (0.254)	0.002 (0.146)
HHgender	0.188 (0.265)	0.138 (0.196)
HHedu	0.161 (0.117)	-0.044 (0.097)
HHage	0.005 (0.006)	-0.0002 (0.006)
HHhealth	-0.081 (0.088)	0.067 (0.086)
Size	-0.087** (0.041)	0.016 (0.039)
Ratio <sub>labor</sub>	-0.124 (0.280)	-0.053 (0.271)
Lage	-0.001 (0.011)	-0.017 (0.010)
Ledu	0.086 (0.065)	0.035 (0.057)
Lhealth	0.146 (0.173)	0.083 (0.167)
Lnmedical	0.007 (0.010)	0.001 (0.011)
Infrastructure	0.067 (0.067)	-0.079* (0.045)
Constant	-0.754 (0.650)	-0.594 (0.579)
Observations	204	190
R <sup>2</sup> within	0.0743	0.1109
R <sup>2</sup> between	0.1554	0.4868
R <sup>2</sup> overall	0.2003	0.4122
Hausman Test	Prob > chi <sup>2</sup> = 0.0173	Prob > chi <sup>2</sup> = 0.2844

Standard errors are reported in parentheses. \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

between the maximum and minimum values of the proportion of disadvantaged human capital groups is 1, it can be inverted using Equation 2, leading to a proportion of vulnerable human capital groups of approximately 0.5. This suggests that when the line for the income mobility indicator intersects with the line for income fitting at 0.5, the income and percentage rate of income distribution are almost

equivalent. If the range is wider, industrial aid is more effective in reducing income disparity, but the impact of income growth is reduced. If the range is narrow, the effect of industrial aid on income growth becomes more prominent. However, the potential to reduce the income gap among farming households is lower. Therefore, when the proportion of individuals with low human capital is 0.5, it may

TABLE 5 The impact of different industrial help recipients on rural household income distribution (robustness test).

	Regression 5	Regression 6
	Group: poverty household	Group: poverty and marginal household
	Dependent variable: Gini	Dependent variable: Gini
Industry <sub>poverty</sub>	0.050*** (0.010)	
Industry <sub>marginal</sub>		0.065*** (0.010)
Constant	0.328*** (0.003)	0.323*** (0.003)
Observations	80	80
Cross-sectional observations	20	20
R <sup>2</sup> within	0.0059	0.0119
R <sup>2</sup> between	0.0249	0.0257
R <sup>2</sup> overall	0.0141	0.0189
Hausman test	Prob > chi <sup>2</sup> = 0.0000	Prob > chi <sup>2</sup> = 0.0000

Standard errors are reported in parentheses. \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

be appropriate to pursue both objectives of narrowing the income gap and raising income. Similarly, if the low human capital group includes marginal households that have recently left poverty but remain economically vulnerable, a ratio of approximately 0.65 may accomplish both the aims of reducing the income gap and enhancing income. Compared to households that still live in poverty, marginal households have already lifted themselves out of poverty and their human capital is relatively high; therefore, the effect of industrial assistance is slightly better, which may be a possible reason for the increase in the appropriate ratio of this group to the industrial assistance target after including marginal households.

## 4 Conclusions and policy implications

This study examined the impact of different industrial assistance target groups on farm household income and income inequality in Yunnan Province using longitudinal data from 2017 to 2020. The panel regression model and normalization approach supported the research hypotheses. The findings reveal that the income and inequality levels of farm households depend on industrial assistance targets. If the proportion of industrial aid beneficiaries from high human capital groups increases, farm household income rises, as does income inequality, in contrast to when industrial aid resources are solely directed toward low human capital groups. Additionally, it may be appropriate to allocate approximately 50% of the recipients of industrial support to disadvantaged groups with low levels of human capital to increase income and reduce industrial support inequality, provided that marginal households - those who have recently left poverty but are still economically vulnerable - are not included in the disadvantaged group. If marginal households are included, the percentage increases accordingly.

The study findings elucidate the varying effects of different industrial assistance targets on income and income inequality. It

provides a new analytical framework for analyzing the causes of constraints on the effectiveness of industrial assistance and a basis for decision-making to promote the synergistic goals of increasing income and reducing income inequality in industrial assistance. Based on these results, the following policy recommendations are proposed:

Industrial development should focus on the able person in the villages and include an appropriate share of “capable people.” Lower-income groups lag behind the societal average in their ability to adopt new technologies and potential for self-sufficient development. To establish the impact of poverty alleviation and change the perspective on dependence on long-term financial aid, it is necessary to integrate able persons willing to participate in industrial development into industrial assistance projects. This will have a demonstrable impact on neighboring villagers and address the problem of inadequate motivation within households that have escaped poverty.

However, as the share of vulnerable human capital decreases, the income effect of industrial assistance increases, and income inequality within households increases. Hence, prioritizing the economic advantages of industrial support alone would oppose the objective of promoting common prosperity. In relation to the survey area covered in this study, the author concluded, based on empirical analysis, that 50% of industrial assistance should be targeted at able persons, provided that marginal households - those that have recently emerged from poverty but remain economically vulnerable - are not low in human capital. This approach achieves the dual objectives of increasing income and reducing the disparity of industrial aid. If marginal households are also regarded as comprising individuals with low human capital, this percentage can further decrease.

The findings of this study enrich the research in the relevant field, providing policymakers with both theoretical foundations and practical insights. However, there are some limitations that warrant further exploration in future studies.

First, the data used in this study were collected solely from Yunnan Province. While the data have a certain level of representativeness, differences in regional economic development and policy implementation mean that the applicability of the findings to other regions in China requires further investigation. Future studies should expand the data scope to cover more regions, thereby enhancing the generalizability of the conclusions. Second, this study mainly focused on the performance differences of heterogeneous groups in industrial assistance, but it did not delve into the differential impacts of specific industry types on various groups. Future research could explore the effects of different types of industries in order to provide more precise policy recommendations.

In summary, despite some limitations, this study offers practical insights into optimizing industrial assistance policies from a novel perspective—namely, the scope of target beneficiaries. Future research can extend and deepen the analysis by considering a broader geographical range and exploring more detailed industry types.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Author contributions

JS: Writing – original draft. CZ: Writing – review & editing. BW: Writing – review & editing.

## References

- Bell, A., and Jones, K. (2015). Explaining fixed effects: random effects modeling of time-series cross-sectional and panel data. *Polit. Sci. Res. Methods* 3, 133–153. doi: 10.1017/psrm.2014.7
- Benabou, R., and Tirole, J. (2006). Belief in a just world and redistributive politics. *Q. J. Econ.* 121, 699–746. doi: 10.1162/qjec.2006.121.2.699
- Chen, C., and Cheng, L. (2017). A study on supplying public goods effectively for the continuous area under the goal of industrial poverty alleviation. *Issues Agric. Econ.* 10, 44–51. doi: 10.13246/j.cnki.iae.2017.10.006
- Cheng, X., Chen, J., Jiang, S., Dai, Y., Shuai, C., Li, W., et al. (2021). Impact of rural land consolidation on household poverty alleviation: the moderating effects of human capital endowment. *Land Use Policy* 109:105692. doi: 10.1016/j.landusepol.2021.105692
- Cheng, X., and Wang, J. (2021). Elite capture, the “follow-up checks” policy, and the targeted poverty alleviation program: evidence from rural Western China. *J. Integr. Agric.* 20, 880–890. doi: 10.1016/S2095-3119(20)63444-X
- Conejo, A. N. (2021). *Fundamentals of dimensional analysis: Theory and applications in metallurgy*. Singapore: Springer Singapore.
- Deng, Q., Li, E., and Yang, Y. (2022). Politics, policies and rural poverty alleviation outcomes: evidence from Lankao County, China. *Habitat Int.* 127:102631. doi: 10.1016/j.habitatint.2022.102631
- Fields, G. S., and Ok, E. A. (1999). Measurement of income mobility: introduction to the literature. *Handb. Income Inequality Measur.* 22, 557–598. doi: 10.1007/978-94-011-4413-1\_20
- Guo, Y., Zhou, Y., and Liu, Y. (2019). Targeted poverty alleviation and rural revitalization in poverty-stricken areas: internal logic and mechanisms. *Geogr. Res.* 38, 2819–2832. doi: 10.11821/dljy020190644
- Guo, Y., Zhou, Y., and Liu, Y. (2022). Targeted poverty alleviation and its practices in rural China: a case study of Fuping County, Hebei Province. *J. Rural. Stud.* 93, 430–440. doi: 10.1016/j.jrurstud.2019.01.007
- He, Q. (2022). A sociological study on the mechanism of industrial poverty alleviation: an examination based on a case study of the development and transformation of poverty alleviation industries in Yezhuqiao village, Hunan Province. *China Rural Surv.* 5, 44–60.
- Huang, W. (2017). Impact of China's urban resident basic medical insurance on targeted poverty alleviation. *Econ. Res. J.* 9, 117–132.
- Jia, P., Du, Y., and Wang, M. (2017). Rural labor migration and poverty reduction in China. *Chin. World. Econ.* 25, 45–64. doi: 10.1111/cwe.12220
- Jin, G., Fu, R., Li, Z., Wu, F., and Zhang, F. (2018). CO2 emissions and poverty alleviation in China: an empirical study using municipal panel data. *J. Clean. Prod.* 202, 883–891. doi: 10.1016/j.jclepro.2018.08.221
- lan, L. (2019). Study review on Yunnan “direct transition nations”. *J. Wenshan Univ.* 2, 44–50.
- Li, Z. (2017). Capital transfer or cash transfer: path analysis of Chinese industry precision poverty alleviation and its policy simulation. *J. Financ. Econ.* 4, 68–81. doi: 10.16538/j.cnki.jfe.2017.04.006
- Li, Y., Su, B., and Liu, Y. (2016). Realizing targeted poverty alleviation in China: People's voices, implementation challenges and policy implications. *China Agric. Econ. Rev.* 8, 443–454. doi: 10.1108/CAER-11-2015-0157
- Liu, Y., and Cheng, X. (2022). Does agro-ecological efficiency contribute to poverty alleviation? Empirical study based on panel data regression. *Environ. Sci. Pollut. Res.* 29, 51892–51908. doi: 10.1007/s11356-022-19408-3
- Liu, M., Feng, X., Wang, S., and Qiu, H. (2020). China's poverty alleviation over the last 40 years: successes and challenges. *Aust. J. Agric. Resour. Econ.* 64, 209–228. doi: 10.1111/1467-8489.12353
- Liu, M., Feng, X., Wang, S., and Zhong, Y. (2021). Does poverty alleviation-based industrial development improve farmers' livelihood capital? *J. Integr. Agric.* 20, 915–926. doi: 10.1016/S2095-3119(20)63449-9
- Liu, Y., Guo, Y., and Zhou, Y. (2018). Poverty alleviation in rural China: policy changes, future challenges and policy implications. *China Agric. Econ. Rev.* 10, 241–259. doi: 10.1108/CAER-10-2017-0192
- Liu, Y., Liu, J., and Zhou, Y. (2017). Spatiotemporal patterns of rural poverty in China and targeted poverty alleviation strategies. *J. Rural. Stud.* 52, 66–75. doi: 10.1016/j.jrurstud.2017.04.002
- Lucas, R. E. Jr. (1988). The mechanics of economic development. *J. Monet. Econ.* 22, 3–42. doi: 10.1016/0304-3932(88)90168-7

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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.

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- Mazzonna, F., and Peracchi, F. (2012). Aging, cognitive abilities and retirement. *Eur. Econ. Rev.* 56, 691–710. doi: 10.1016/j.eurocorev.2012.03.004
- Mushinski, D. W., and Pickering, K. (2000). Income distribution inequality: does culture matter? Analysis of Western native American tribes. *J. Econ. Issues* 34, 403–412. doi: 10.1080/00213624.2000.11506279
- Si, Y. (2020). Implementing targeted poverty alleviation: a policy implementation typology. *J. Chin. Gov.* 5, 439–454. doi: 10.1080/23812346.2020.1802212
- Tang, J., Xu, Y., Ma, W., and Gao, S. (2021). Does participation in poverty alleviation programs increase subjective well-being? Results from a survey of rural residents in Shanxi, China. *Habitat Int.* 118:102455. doi: 10.1016/j.habitatint.2021.102455
- Tao, Y., Xie, J., and Yang, J. (2022). Research on the evaluation of industrial poverty alleviation under the background of the internet. *Mathematical Prob. Eng.* 2022, 1–11. doi: 10.1155/2022/9101772
- Taylor, R. N. (1975). Age and experience are the determinants of managerial information processing and decision-making performance. *Acad. Manag. J.* 18, 74–81. doi: 10.2307/255626
- Wang, Z., and Hu, M. (2019). Research on the effect and influencing factors of industrial poverty alleviation in ethnic areas—taking Sichuan-Yunnan Yi nationality area as an example. *Reform Econ. Syst.* 3, 70–77.
- Wang, L., Ye, X., and Chen, J. (2018). Performance evaluation of industrial poverty alleviation from the perspective of precise recognition. *China Population Res. Environ* 28, 113–123.
- Xiao, H., Song, F., Zheng, X., and Chen, J. (2023). Community-based energy revolution: an evaluation of economic and social benefits of China's photovoltaic poverty alleviation program. *Energy Policy* 177:113555. doi: 10.1016/j.enpol.2023.113555
- Xiao, H., Zheng, X., and Xie, L. (2022). Promoting pro-poor growth through infrastructure investment: evidence from a targeted poverty alleviation program in China. *China Econ. Rev.* 71:101729. doi: 10.1016/j.chieco.2021.101729
- Xu, B., Wei, M., Teo, B. S., and Yoff, S. K. M. (2022). Assessment of the poverty alleviation effect of industrial poverty alleviation: based on poverty vulnerability perspective. *J. Positive School Psychol.* 6, 861–881.
- Xu, L., Zhang, Q., and Shi, X. (2019). Stakeholder strategies in poverty alleviation and clean energy access: a case study of China's PV poverty alleviation program. *Energy Policy* 135:111011. doi: 10.1016/j.enpol.2019.111011
- Yang, Y., and Lu, H. (2018). Multiple institutional logics and dissimulation of industrial poverty alleviation project—a perspective of organizational field. *China Agric. Univ. J. Soc. Sci.* 1, 110–116. doi: 10.13240/j.cnki.caujsse.20180202.013
- Yang, B., Xu, T., and Shi, L. (2017). Analysis of sustainable urban development levels and trends in Chinese cities. *J. Clean. Prod.* 141, 868–880. doi: 10.1016/j.jclepro.2016.09.121
- Yang, G., Zhou, C., and Zhang, J. (2022). Does industry convergence between agriculture and related sectors alleviate rural poverty: Evidence from China. *Environ. Dev. Sust.* 25, 12887–12914. doi: 10.1007/s10668-022-02594-y
- Zhang, D., Wang, W., Zhou, W., Zhang, X., and Zuo, J. (2020). Effect of rural land consolidation on poverty alleviation and income increase in different models: a Chinese study. *Land Use Policy* 99:104989. doi: 10.1016/j.landusepol.2020.104989
- Zhang, R., Yuan, Y., Li, H., and Hu, X. (2022). Improving the framework for analyzing community resilience to understand rural revitalization pathways in China. *J. Rural. Stud.* 94, 287–294. doi: 10.1016/j.jrurstud.2022.06.012
- Zhou, Q. (2021). Poverty reduction performance and income distribution effect of targeted poverty alleviation policies. *Chinese Rural Econ.* 5, 38–59. doi: 10.20077/j.cnki.11-1262/f.2021.05.003
- Zhou, Y., Liu, Z., Wang, H., and Cheng, G. (2023). Targeted poverty alleviation narrowed China's urban-rural income gap: theoretical and empirical analysis. *Appl. Geogr.* 157:103000. doi: 10.1016/j.apgeog.2023.103000
- Zhu, H., and Bi, J. (2021). Key directions and policy adjustments for consolidating and expanding the achievements of poverty elimination and effectively linking with rural revitalization: discussion on the "three regions and three prefectures" lifted out of poverty. *J. Agric. Univ. Soc. Sci.* 6, 80–90. doi: 10.19714/j.cnki.1671-7465.2021.0089